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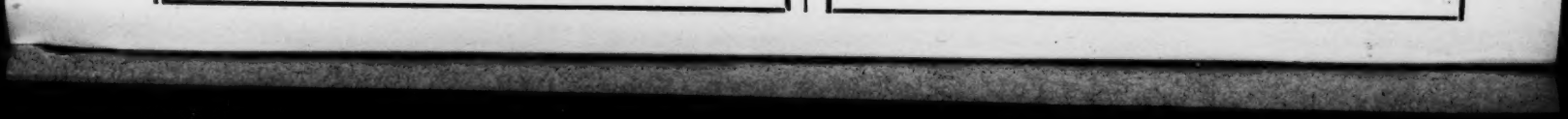

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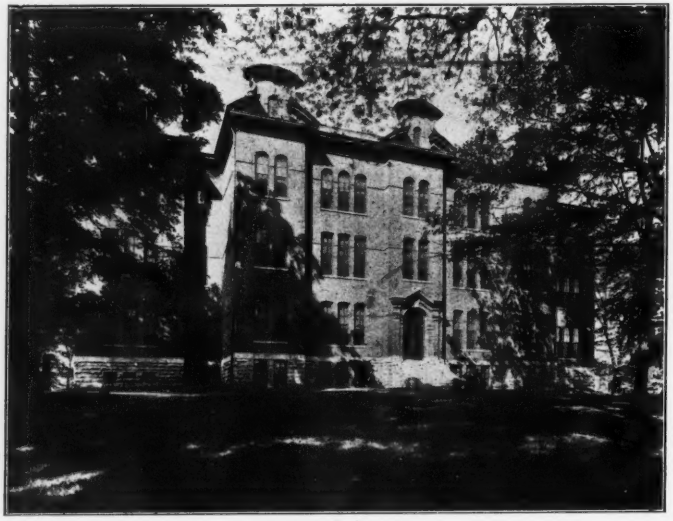

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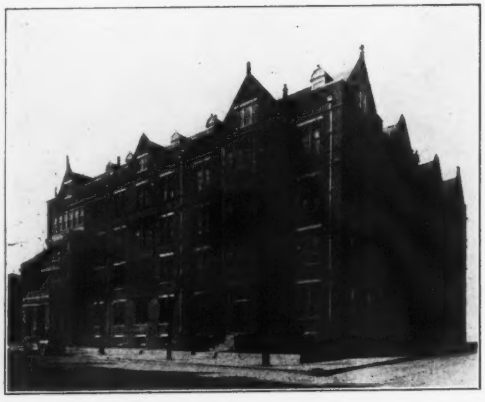

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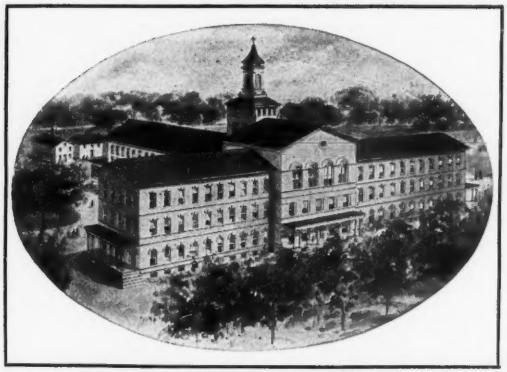

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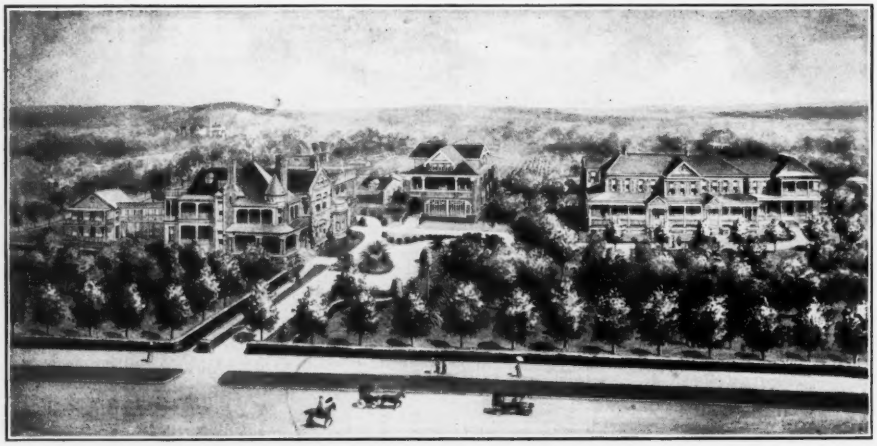

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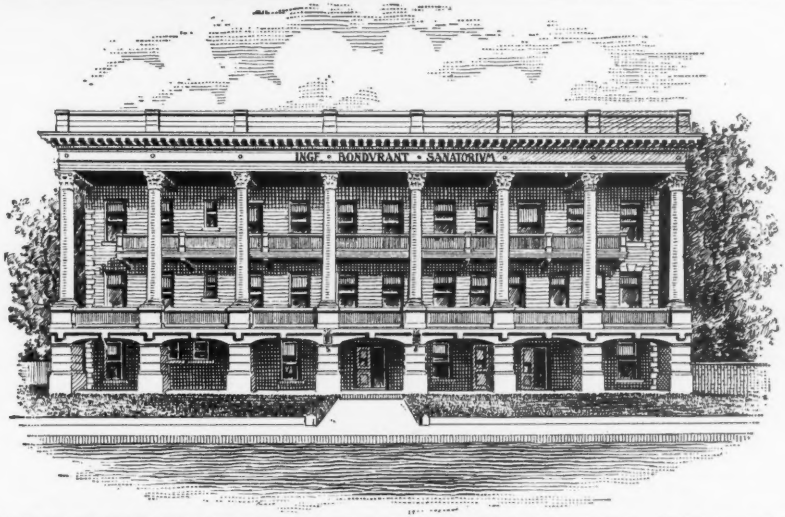

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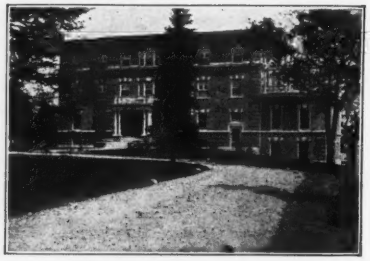

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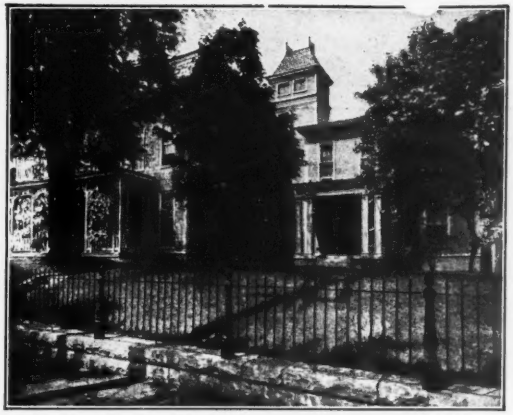

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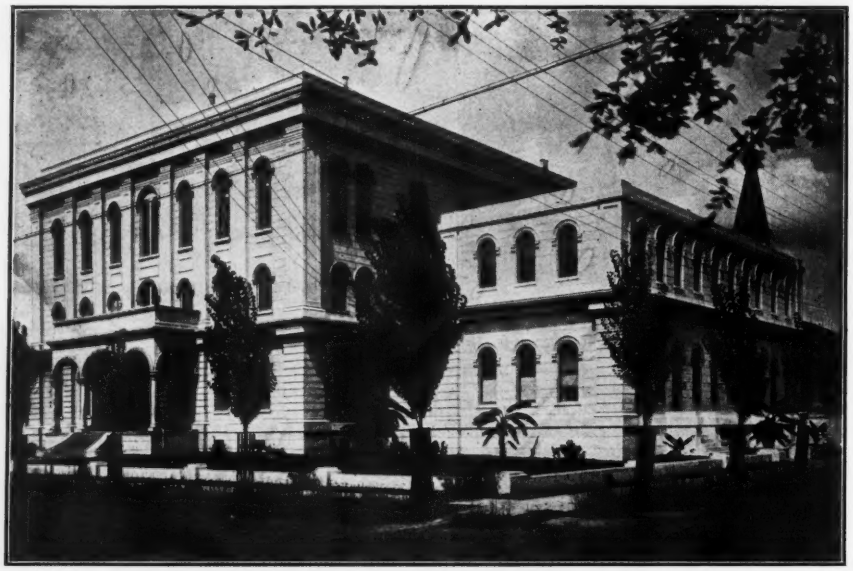

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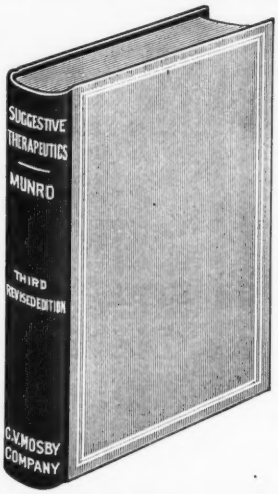

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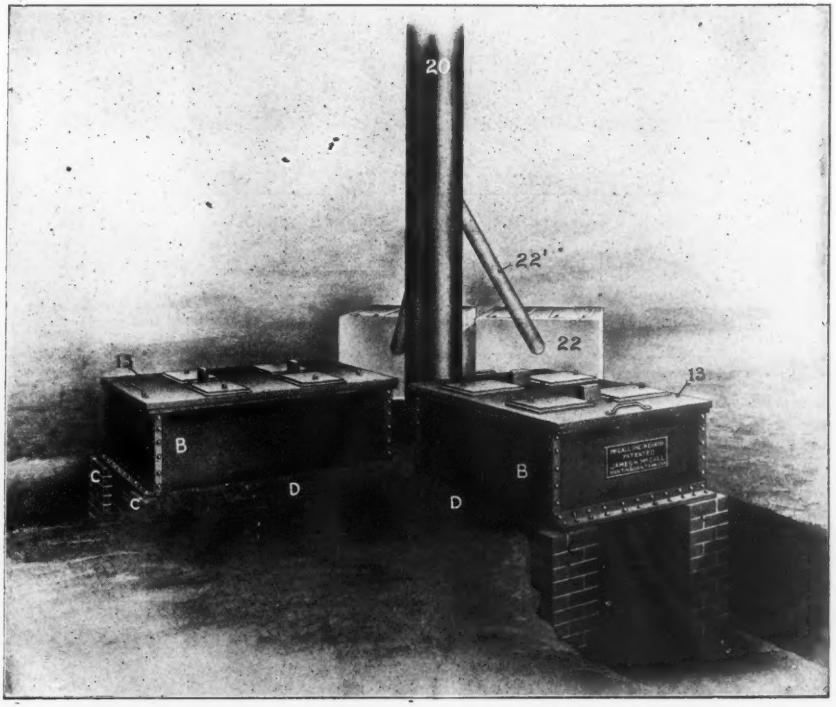

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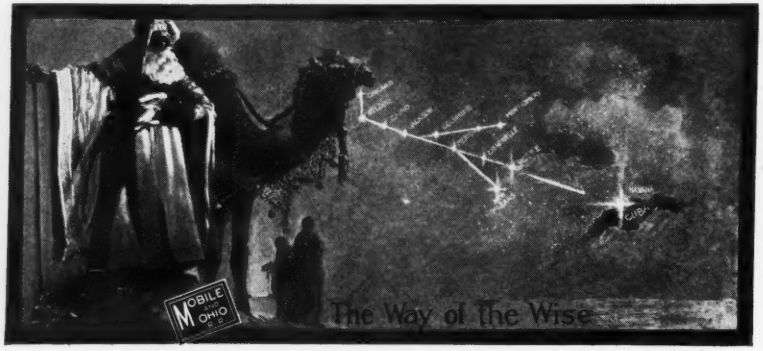

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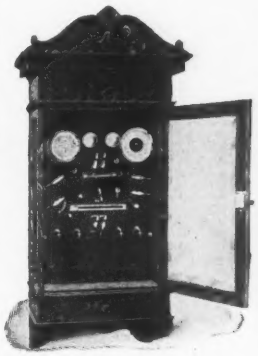

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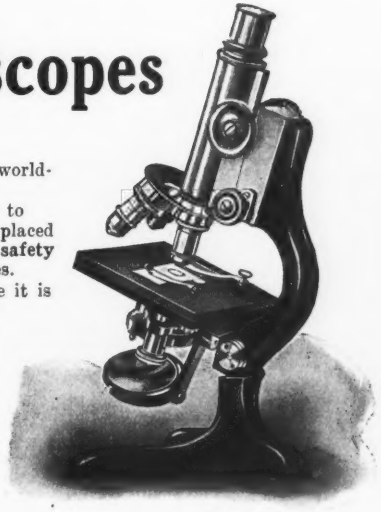

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SOUTHERN MEDICAL JOURNAL

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ORIGINAL ARTICLES

THE SURGICAL TREATMENT OF DYSPEPSIA*.

By STUART McGUIRE, M.D.
Richmond, Va.

A generation ago nearly all of our knowledge with reference to disease conditions was derived from post-mortem examinations made by pathologists. Today much of our information is derived from ante-mortem examinations made by surgeons. Observations taken during the early stages of disease before the initial lesions are obscured by secondary complications and terminal infections have changed many of the theories formerly held by the profession, and in no instance has this been more radical than with reference to the so-called "dyspepsias."

It was formerly taught that indigestion was purely a functional disturbance of the stomach to be treated by hygienic, dietetic and medicinal measures. It is now accepted that indigestion, when chronic or recurrent, is almost invariably caused by organic changes in the stomach, duodenum, gall bladder or appendix, and that relief from symptoms can only be permanently secured by surgical correction of the anatomical lesions.

Every one suffers at times from indigestion due to indiscretions in eating, but no one has constant, persistent dyspepsia lasting for months or years unless it be due to some organic disease. A case of indigestion ought not to be subjected to surgery until it has been carefully and propertly treated by medical measures, but every case that fails to secure relief in a reasonable time should be examined to see if there is not some indication for operative intervention.

In investigating a patient it should be remembered that while the symptoms may be due to disease of the stomach itself, they may also be due to reflex irritation from disease of some other abdominal organ. It is a fact that in nine cases out of ten it will be found that the lesion is not in the stomach, but in some associated viscus, such as the duodenum, appendix or gall bladder. In other words, while the symptoms are gastric and the treatment is surgical, the operation required is not necessarily on the stomach.

Appendicitis, cholecystitis and duodenal ulcer are supposed to interfere with digestion by causing a spasm of the pylorus. Pylorospasm is a protective effort on the part of nature to prevent the passage of irritating gastric contents into the intestinal tract. The most prominent symptom is a cramping pain in the epigastrium, which may last only a few minutes or may continue several hours. In some cases the spasm may relax suddenly, in others it may terminate slowly and gradually. Some patients have attacks several times a day, others at intervals of weeks, and others still only once or twice a year. In the interval between attacks digestion may be normal. During attacks the peristalsis of the

*Paper read at meeting of the Medical Association of the State of Alabama, at Montgomery, Ala., April 18-21, 1911.

stomach is increased, but food cannot pass through the pylorus, and often relief only comes after vomiting. Pylorospasm is a symptom, not a disease. It is usually the expression of some remote abdominal trouble. To effect a cure the real cause of the condition must be found and removed, and the patient subsequently treated until the hypersensitiveness of the pyloric muscle is relieved and its spasm habit overcome.

The essential role which surgery plays in the successful treatment of the various forms of so-called chronic dyspepsia will be impressed by a brief review of the symptoms of duodenal ulcer, infection of the bile tract, chronic appendicitis and gastric cancer.

Duodenal ulcer, while formerly thought to be rare, is now known to be a very common disease. Patients give history of indigestion of many years' standing with intervals of complete relief from symptoms. At first there is the development of a sense of weight, oppression and distension after meals. Later it is noted that discomfort occurs regularly from two to three hours after taking food. Pain comes on gradually, and slowly increases. There is a sensation of fullness followed by eructation of gas or bitter fluid. Symptoms are immediately and completely relieved by taking food, and patients frequently keep a biscuit or glass of milk easily accessible in order to arrest the "hunger pain" when it develops. A characteristic feature of duodenal ulcer is the recurrence of symptoms after intervals of complete relief. Attacks come on as the result of exposure to cold, imprudence in eating, worry or overwork.

The physical signs consist in some tenderness in the epigrastrium and rigidity of the right rectus muscle. In the later stages, when stenosis develops, there are the signs of dilated and obstructed stomach. Still later there may be hemorrhage, the blood appearing in either vomitus or feces. Hemorrhage is usually a late symptom. It is evidence of deep penetration of the walls of the duodenum by an ulcer whose existence should have been recognized by other symptoms at an earlier period.

Chronic cholecystitis, with or without gall stones, is another common cause of indigestion. Symptoms during the early stage of the disease are always referred to the stomach. There is usually gastric distress coming on shortly after taking food and relieved by eructation of gas. Frequently there is nausea and vomiting, attended by a dull pain beginning in the epigastric region and extending around the right side at the level of the tenth rib. Later there may be typical attacks of hepatic colic. The pain is sudden in its onset and sudden in its relief, and is attended by a sharp catch in the breath. It is cramplike, goes through to the back and up to the right shoulder blade. The pain is not produced nor is it relieved by taking food. It is attended by nausea, retching and vomiting, and followed by sweating and prostration. Still later there may come the symptoms of duct obstruction with jaundice, or duct infection with chronic pancreatitis. Jaundice is not present in 50 per cent of cases and its absence should not prevent a proper diagnosis.

Chronic appendicitis may exist for years and cause no symptoms except dyspepsia. The patient has no pain or tenderness at McBurney's point, but suffers with acid stomach, eructation of gas and occasional vomiting. The symptoms come on after eating, but there is no regularity, as one meal may cause trouble while another produces no ill effect. Food never gives relief and exercise usually makes the symptoms worse. After a longer or shorter time there comes an acute attack of appendicitis with symptoms which make the diagnosis evident. An operation is done to save the patient's life, and six months later the individual comes back to say you have restored his health. The removal of the appen-

dix has cured his dyspepsia and he is able to eat what he pleases with impunity.

Cancer of the stomach usually develops at the seat of an old ulcer. A careful investigation of the patient's symptoms will usually show history of indigestion extending over many years, first characteristic of hyperchlorhydria, then of gastric ulcer, and finally of cancer of the stomach. There is first indigestion with sour eructation and pain two to five hours after eating. Later vomiting of bitter acid fluid, constant discomfort or distress, and intense pain immediately after eating. Finally obstructive symptoms with vomiting of delayed food mixed with blood. There is progressive weakness, emaciation and cachexia. In the last stages there is usually the presence of a palpable tumor.

The foregoing histories cover a host of cases treated by the general practitioner for gastralgia, chronic gastritis, sour stomach or acid dyspepsia. They are definite surgical diseases and should be recognized as such.

Spasmodic obstruction of the pylorus or pylorospasm due to reflex irritation from chronic disease of the appendix or gall bladder should be relieved by removing the cause, not by an operation on the stomach itself.

Organic obstruction of the pylorus from the cicatricial contraction of an ulcer of the stomach or duodenum should be relieved by the provision of a new outlet by means of a gastroenterostomy.

Non-obstructing ulcers and early carcinomas of the stomach should be removed by resection.

I trust the views expressed will not be considered too radical. None of them are original but are a compilation from the writings of men of experience and authority. With increasing knowledge of disease from observations made by surgeons during operations, from investigations conducted by scientists in laboratories, and from deductions made by internists from the histories, symptoms and physical examinations of patients in actual practice, we find our views as to the proper treatment of certain conditions rapidly changing.

Today ex-ophthalmic goitre or hyperthyroidism is considered a surgical affection. I feel sure in time it will be transferred to the department of internal medicine. Until recently dyspepsia has been treated medically. I feel sure the conscientious physician will soon refer all cases which resist a reasonable amount of treatment to the surgeon.

CONCLUSIONS.

1. Persistent or recurring indigestion is not due to errors of secretion but to anatomical lesions of the stomach or associated viscera.

2. A patient who is not relieved in a reasonable time by medical treatment should have the abdomen opened even if the operation is in the nature of an exploration.

3. While the symptoms are gastric in nine cases out of ten, the lesions will not be found in the stomach, but in an associate viscus, such as the duodenum, gall bladder or appendix.

4. Pylorospasm should not be treated by a gastroenterostomy but by an effort to diagnosticate and remove the irritation which produced it.

5. It is advisable at the time of the operation to examine all abdominal organs and correct every abnormality lest the obvious may not be the real cause of the symptoms.

6. It is important that these cases should have proper post-operative and post-hospital treatment.

THE HOME TREATMENT OF TUBERCULOSIS, WITH COMMENTS ON THE USE OF TUBERCULIN.*

By CHARLES M. NICE, M.D.,
Pediatrician to St. Vincent's Hospital, Birmingham, Alabama.

An apology need hardly be made for the subject of my remarks, even if it is a frequently discussed one and one which every text-book and medical journal has dealt with more or less extensively. The problem of home treatment of the tubercular is a vital one to our profession as well as society, and the question of solution is daily presented to each of us, therefore, any study reviewing accepted knowledge, or bringing out a single new thought, should be sanctioned with good grace.

The home holds a position to tuberculosis as important as its relation to the government, and it is here that through necessity or desire the physician is most frequently called upon to treat tuberculosis. It behooves us, then, to equip ourselves with the necessary requirements to care for our patients with the greatest ease, satisfaction and success. In this effort it is essential that every phase of a patient's physical as well as mental condition be considered, together with his environments, that a correct decision be made with regard to the advisability of home treatment. Those who are far advanced in the disease, those who are dependents on the public, and those who are adverse to routine treatment, should be set apart as unfit subjects for the home. Choose as you may from the remaining class of sufferers, and the home may be made an acceptable and warranted constituent to a treatment filled with a greater or lesser hope and success.

This summary of an extensive subject concerning the most important factors necessary for home treatment are considered in contradistinction to sanitarium treatment, but at the same time with emphasis on the desirability of making a sanitarium out of the home with all of its cleanliness, brightness and routineness. Having thus selected for the patient it is advisable to at once become his master, friend and instructor, and thereby gain his co-operation secured with earnestness and hope.

Especial care for the importance of instruction should be paid for thereby hangs the keynote to management and knowledge which are the fundamental requisites to good treatment. This is accomplished at the expenditure of time and energy which is often received with stupidity and inquisitiveness on the part of the patient, but it is necessary in every case. It would be of great advantage if we could put this education on the shoulders of the sanitarium, and when possible it is wise to suggest that a residence of at least two months be spent at such a resort.

The next most successful method of schooling is to give your direcions in a typewritten, or booklet form. With this it is customary to embody under the heading of "General Directions" some remarks on the hopefulness of the condition, the request that he talk of his condition only to his medical adviser, directions for hours of rest and how accomplished, directions for clothing, for sleeping, for bathing, for exercise, a possible dietary and foods which should be prohibited, and the numerous other incidentals which you have already spoken of to him. In another booklet should be his temperature charts, reports of his daily condition and visits of his physician. The most important features are thus emphasized to him, and his co-operation in the treatment is made apparent.

Regularity in visits to the patient is important to sustain interest, and on each occasion after the patient has made his report, ten or fifteen minutes should be spent in cheerful

*Read by title, Southern Medical Association, Nashville, Tenn., November 10, 1910.

conversation and instruction on food, clothing, infection, or any allied subject which will enable a better understanding of his or her condition. Some time is also usually required by the family, who must share in the knowledge of treatment and prophylaxis.

In many instances, the location of the home is not all that it should be. When possible it is better to suggest at once that a more desirable location be selected. Often a suburb or a more cleanly portion of the city with a minimum amount of travel and plenty of sun can be arranged for, affording at the same cost an ideal abode for the invalid. All of these things should be arranged for in the beginning when enthusiasm is at its height. Just so it is with the selection of a tent, porch, room or roof to be occupied.

The proper elevation, flooring and equipment of a tent, necessary awnings, toilet facilities and arrangement of the porch; proper covering, protection and bedding for the roof; sufficient windows, air space and furniture of a room, can be secured comfortably at a very low cost.

Facilities should be afforded so that the patient can spend the greater part of the time out of doors, remembering ond directing that *fresh air* is most favorable to a cure, and that at least ten hours of every day should be spent in the open. Explicit directions are given as to precaution against becoming chilled, against rain and direct winds.

A tent when avilable through the agency of a large or commodious lawn is preferable to abode within the house, in that it gives the maximum amount of fresh air and separates the family as an additional means of prophylaxis. It should be of sufficient size, with walls of proper height, to allow raising or lowering at will. It should be equipped with a fly and the floor well above ground. When possible it is a great convenience to have a separate smaller tent, or even a corner of the one tent curtained off for toilet facilities. The tent, including construction and an equipment of a comfortable cot, reclining chair, bowl, pitcher, lamp, bedding, linen and oil stove can be purchased for $25 and upward.

A convenient porch-end, when accessible, can be equipped with awnings, roll curtain, bed, and so forth, for a similar sum. This is probably next in desirability to the tent.

The room, if selected, should furnish at least 3,000 cubic feet of air space. It should have at least three windows, be on the ground floor, and deprived of all draperies and unnecessary furnishings. It should have a southern exposure, and the floors should be painted or waxed. It is also of advantage to have a fireplace.

Roof living is often necessary and sometimes possible. The required furnishings are similar to the porch.

It is necessary to give thorough directions concerning the hygiene of the abode, at the same time explaining that the fulfillment of such precautions prevents danger to others and makes it possible to enjoy the companionship of family and friends without danger. These directions should include the proper disposal of the sputum through the agency of paper or linen handkerchiefs, which are immediately burned in the former use and placed in five per cent carbolic solution with the latter. All bedding and linen of a washable character should be cared for in a similar solution before sending to the laundry. Directions for individual dishes and drinking cups to be placed in solution or boiled after using should be made plain. Abstainance from kissing, hand-shaking, care of the lips, teeth and grooming of the body should be carefully gone into.

The floors of the apartment should be systematically cleaned with carbolic solution. the patient being outside of the room during this procedure. All carpets should be taken to the lawn for cleaning.

Rest, in its fullest sense, has been one of the greatest advances made in our modern treatment. It is pre-eminent in importance and required in every case. Certain hours should be set apart for recumbent rest, which is our

greatest aid to bodily reconstruction and cessation of impairment. A temperature of 102° F. should call for continuous rest in bed. A temperature of 100° at any time of the day should enjoin recumbent rest at least during the hours of its presence. Even 99.5° F. should call for two hours' afternoon rest, and should interdict even walking as an exercise. By rest, mental quiet is especially emphasized in importance.

A certain amount and kind of exercise is called for in nearly every home treatment at some time or other. Generally speaking, walking for certain distances and up certain inclines is most adaptable for the ordinary case. Other exercises to meet certain requirements may be sought from any of the text-books on the subject and tried. The points to be guarded against in any given case are fever, which should not permit walking, and avoidance of any form of fatigue in desirable cases.

Parallel with fresh air and rest in importance is *food*. Superalimentation is the rule, but discretion is required here as in all branches of the treatment. For instance, the advice to eat as much as possible, with a mention of milk and eggs, often does the treatment and your advice an injustice. The patient's condition must first be carefully considered, and your directions should be explicit as to the quantity, preparation and time for food. The principles involved must be derived from the quantity of food necessary for the average person, namely: 120 grams of albumin, 50 grams of fat, 500 grams of carbohydrates, prepared in a mixed, tasteful, assimilable diet. After this, the possibilities of digestion in the individual case, the fever and the emaciation must be considered to arrive at a desirable dietary for each case.

Eggs and milk should be the basis for such a diet. Meats, vegetables, cream, butter and olive oil should also be liberally used. It is a good custom to give specified hours for eating, and to start the treatment with a minimum quantity of eggs and milk, gradually increasing, and a day or two later adding one more, then two, and so on in combination.

Eggs are best taken raw immediately after the meal as a second dessert. Eight to ten can often be taken daily with ease. Milk is given at regular intervals, preferably between meals. Ordinarily, alcohol is prohibited. Meats are more digestible and nutritious when semi-cooked or served rare. They are allowed cooked any way except fried. Prepared foods, as a general rule, are expensive, of little food value, and should only be prescribed in exceptional cases.

As a general rule, the quantity of the food should be disproportionate to the illness in that large amounts are necessary for repair, and can be digested in the face of serious symptoms. Forced feeding when there is no desire, when the fever is continuously high, and when there are derangements of the digestive canal, is a mistake and detrimental to the desired results.

Among the many symptoms of the disease which require treatment, whether at home, sanitarium or dispensary, is *fever*. Rest is by far the simplest method of controlling this. Fresh air out of doors, day and night, together with sufficient and proper food, reduces fever in any case to some extent. When it remains above 102° F. for any time cool sponging, alcohol rubs, ice caps or a hot mustard foot-bath may be resorted to. It is rarely advisable to use drugs for this purpose, but in some instances quinine, phenacitine or pyramidon may be called for.

Cough is similarly lessened by rest and fresh air. Much relief can be accomplished by control on the part of the patient, especially the dry, hacking, unsuccessful cough. A careful examination for the cause will often show the specific source of irritation, perhaps in the pharynx or larynx, perhaps cardiac embarrassment. Treatment of the cause, whether by application or heart tonics, will often bring great relief. Excitement should be avoided; a glass of hot water before breakfast, or a mustard paste over the sternum are other means of

treatment. Among the drugs we have recourse to are terpine hydrate, ammonia preparations, bromides, heroin, codeine and hydriodic acid, prescribed with reference to the character of the cough.

Sweats are relieved by sleeping out of doors, rest and good food. The bedding should be of sufficient weight to keep the patinet warm but not to overburden him. Sponging with cool water, alcohol or vinegar before retiring is of service. Agaricin and atropin are acceptable for use when the other simpler methods fail.

Anemia is treated in connection with fresh air and food, with iron or arsenic. Blaud's pill in the former, and Fowler's solution in the latter are the preparations usually selected.

Disturbances of the *gastro-intestinal tract* occurring early as well as late in the disease require great care in diagnosing, the test meal and examination of the feces often giving a more exact method of quickly defining the necessary treatment. Reduction or abstainance from food, or a more delicate preparation of the same, is usually the first requirement in any case. Dyspepsia, diarrhoea, constipation, hypo and hyper-acidities are relieved by appropriate remedies in conjunction with the former suggestion. Among the drugs usually selected from are calomel, hydrochloric acid, sodium bicarbonate, nux vomica, belladonna, bismuth and opium.

The treatment of *hemorrhage* has advanced little in recent years, and we still cling to the old methods. Among these rest stands in advance. This is obtained by a hypodermatic injection of morphine. It is the first thing to be done in every case. It gives the physician something for immediate action, and controls the accompanying fear as well as the cough. Nitroglycerine is also a good drug to administer at the same time. Gelatin and calcium lactate have never proved to be of the least value. The use of human or animal sera may yet prove efficient in cases of continuous hemorrhage. The further treatment may be continued by the application of an ice bag to the supposed area of bleeding, small quantities of cracked ice may be given by mouth. Prone position, cessation of speech and early movement of the bowels are more or less advantageous.

The *cardiac weakness* and nerve depression are controlled with rest, regular bowel movements and the use of strychnia, iron and digitalin (Merck).

The specific mode of treatment which has given rise to most thought and work in the past few years has been the administration of tuberculin. Since 1890, when Robert Koch first gave the report of his discovery, there have been many and varied opinions among the profession as to its value and the correct method of administering. Since the undoubted correct interpretation of the value of small doses it was hoped that by this time a definite opinion might have been concluded as to its ultimate value in the treatment of tuberculosis, but the contributions at hand would show that those who have systematically and impartially experimented in its uses have reached only a more conservative expression of their results with a possible favoritism for the continued usage.

At present it has many advantages in home treatment aside from its real value of specificity, if that be true. It brings the patient and physician more often and intimately together, and allows the educative principle to be conserved.

From the reports studied, different writers are together only on the point of minimum dosage, some preferring repeatedly small doses, especially in children, others practicing the progressive method of treatment. As to subjects permissible for this treatment, we have all learned by experience to be more selective. It is for this failure of experience that all beginners in the use of tuberculin materially influence their statistics for bad by selecting patients at random. Incipient and partially advanced cases without complications, and a temperature under 101° F., after two

weeks' rest in bed, with probably greater advancement in children, allows a classification with widest range for the administration of tuberculin.

From my personal experience with the customary methods of injections, I have, in selected cases, begun to look for signs of improvement within the first month of treatment. Such is seen by a decline in fever, lessened cough, absence of sweats, increased appetite, gain in weight and detectable physical improvement.

New sera are almost as numerous as have been the varied reports. My experience has been limited to the use of Deny's Bouillon Filtrate (B. F.), which is given in a starting dose of not over 1-1,000,000 of a milligram. In children the best results are gained by repeating a minimum dose at intervals of ten days to two weeks. Its action is considered to be markedly beneficial from a curative standpoint, and especially prophylactic against recurrence of the disease.

In adults, the dosage is gradually increased at five to seven-day intervals until a limit of 1-10 to 1 milligram is given, the duration of treatment lasting from seven to nine months. In some cases it is advisable to give up to the nrst dose producing a local reaction, or, say, up to 1-100 of a milligram, and observe continuous improvement by repetitions of that dose over a period of time.

The opsonic index for dosage is being used less than formerly, and is rarely applicable or possible outside of the sanitarium or dispensary. Most physicians now depend on the clinical manifestations which have proved reliable and satisfactory in my work. Especial value is attached to local reactions which should be observed carefully with other symptoms. Records should be continuously kept by both physician and patient on typewritten charts made especially for such reports. These contain any and all symptoms of a reaction that might be expected, and are recorded or checked off daily by the patient.

Reactions are not worked for but are avoided. Mild reactions, the only kind that careful dosage allows, possibly do good, and are certainly of great advantage in the determination of maximum dosage for the patient.

Reports are made concerning the alternate usage of human and bovine tuberculins, but in this I have had no experience.

The site of injection is usally in the intrascapular, pectoral or deltoid region. After three years of daily use of tuberculin there has never been an abscess, severe reaction or any symptom that might have shown a contraindication to the drug. Many useless doses were earlier given to far advanced cases which experience has taught were wasted. My opinion is that tuberculin is of advantage in selected cases, and when properly given by a rule only applicable to the individual case. My results have been favorable, and the administration will be continued.

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RUDOLF VIRCHOW.*

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The history of the men of earth, that men have loved to hear and to repeat, is a strange and biased history; it is unfair and incomplete. This is so partly because of the times in which the men of history lived and wrought, partly because of the comprehension of the people, partly because of poor facilities in times past for distributing knowledge, and somewhat, perhaps, because of a fanatical fear on the part of religious enthusiasts that scientific men would advance some doctrine that would dim the brilliancy of revelation and dogma. And it is precisely the scientific man that history has neglected. We have been taught the names of soldiers from Alexander and Caesar and Hannibal down to Napoleon and Grant and Lee, and to revere their memory; great historians have immortalized themselves by perpetuating the sayings and doings of dead statesmen and soldiers. Mommsen almost worships Caesar in the most splendidly written tribute in the pages of history. The literary man, the theologian, the rulers of the earth, the orators have been handed down until every boy and girl has a fair knowledge of the so-called history of civilized countries, ancient and modern; but who has taken it upon himself to write the history of the men whose brilliant minds and ceaseless perseverance have made all the advancement of modern times possible? All men know Shakespeare and Chaucer, Demosthenes and Cicero and Pitt, and Bismarck and Garibaldi and Webster and Clay, but who knows Helmholtz? Who knows Jenner and Harvey and Hunter? Who knows Gallileo? Who knows Welch or Pasteur, or what they did and how they did it? And who cares? Who that prates of modern advancement of science, drinks pure water, is guarded from contagion, immunized against some deadly infection, or snatched from the arms of death by the administration of a few cubic centimeters of antitoxin, knows that the genius of Pasteur has saved more lives than the combined armies of history have ever destroyed? And who knows that he found the great secret of modern medicine while, as a chemist, he was following the ignoble business of saving the chickens of France from an epidemic of chicken cholera?

I have, therefore, chosen to talk to you tonight of one man whose name shines in the firmament of a just history with a brilliancy equal to that of any ruler dead or alive, and whose benefactions to mankind would require the deeds of a score of worthy historical characters combined to approach their value.

Rudolf Virchow was born October 13, 1821, at Schievelbein, a village of Pomerania; his father was a small shopkeeper and farmer, with no prestige, no wealth, no blue-blooded ancestry. If I should be asked who Virchow was, then, that one should read of him before a body of educated men, my answer to the laymen would be that he had sufficient political weight to antagonize the government policies advocated by Bismarck, to offend the former and cause him to challenge the latter to a duel, which was promptly refused, through no fear of combat; for five years afterwards he exposed himself to the numberless bullets of a battle on French soil, in rescuing wounded soldiers from the ranks. To the scientist or physician I would say, to engage his attention uninterruptibly, that Virchow was the father

*Address delivered to the graduating class of the Medical Department of Vanderbilt University, May 23, 1911.

of modern medicine, and that what medicine is today he made possible and to an incredible degree completed by placing the study of pathology on a rational basis and banishing with a masterful hand the dreams that physicians formerly held of disease processes, closely akin to, if indeed not partaking of, the superstitions held by the laity, which even now are not completely extinct.

The history of scientific development and of its universal acceptance, its adoption as a part of the average man's belief and as a guide for his action is more interesting, I dare say, than any political history. The storms that have raged round the heads of men who have had the inspiration to behold the light of a new, especially if a fundamental, truth, have been ceaseless and they have usually come from a misconception of some religious duty. Imagine that the world is flat; imagine that every man believes it so; imagine that they believe it to be a part of the scientific teaching of the Scriptures; then imagine a man, inspired without their knowledge, a man of their own bringing up, taught among them and by them and accepted as intelligent; imagine him, I say, advancing the idea that the earth is round, and their religious leaders, the only ones they had, proclaiming it heresy. Would you not have thought him possessed? Go one step further and imagine that this man could adduce unquestionable proof that the world is round. Would not that very absolute proof have convinced all right thinking men that the devil himself had suggested the idea and sealed it with the proof? By the time this fact was accepted by a few and seen to have no particularly evil influence on the tenets they held, another storm came, and it was shown that the earth revolved and that the sun did not move around it. Then came the teaching of Darwin that a process known as evolution was working in the kingdom of living things, and that it bound every living thing by a kindred tie to everything living now and that had lived in the past and showed that the history of succession was a fact, and that variation and selection were laws, as much as gravitation is; that instead of a hundred thousand petty creations there was one gigantic creation; instead of the work being finished it was only now well underway, and that instead of a retired God resting from his labors already some thousands of years, it was dominated, yes, pervaded, by a busy, active, living God! This was the great storm; this was, they said, the effort to establish materialism and to uproot all moral and religious institutions and turn mankind to riot in the appetites of the flesh. Today no man asks you whether you are an evolutionist or not. They like improved apples and pears, and chickens and flowers and dogs too well for that; they do not care. Evolutionists sit in the churches and hear and accept the gospel; they speak from the pulpits; they vote in church directorates; they teach in theological institutions. They have grasped hands, religion and science, true religion, true science, and if the former must have theories as a working basis, and the latter must teach dogmas as a discipline for the weak, they both recognize that the explosion of a defective theory or of a false dogma is a positive gain for absolute knowledge.

Among the false conceptions of the past was a teaching of spontaneous generation, or abiogenesis. The idea was well grounded, it seems, in the minds of the people, namely, that organized life might come from inorganic matter, that the living might spring from the dead. Rules and formulae were given for the speedy artificial manufacture of young rats and mice, of frogs and fishes, of flies and worms. This idea was not simply a popular belief; it was accepted by intelligent men. Ovid writes beautifully of the processes in his poems. Only in the seventeenth century did Francesco Redi demonstrate the incorrectness of the view by experimenting, simply but accuratly, with the propagation of flies. The proof was unquestionable; flies meant that there

had been a previous generation of flies, and that no flies can come into existence when no flies have preceded them. From this the doctrine of biogenesis was gradually extended until it became universally accepted that life comes only from antecedent life. That is an axiom of modern science. There is no exception; the doctrine of abiogenesis is a strange bit of the history of a superstitious age. This doctrine of biogenesis related only to individuals, and was in no way applied to parts or organs of the individual; to the processes of health and not at all to the mysteries of disease. Illness and the changes wrought in the animal and plant bodies were still shrouded in the darkness of ignorance and superstition. Scientific men were still guessing what disease was, and accepting their guesses with as much composure and confidence as a mathematician accepts the multiplication table.

It was at this stage in the development of science that the great work of Virchow began, greater than all his other works combined, and the immensity of it becomes immeasurable when one recalls that while his teaching pertained directly to the study of medicine, there was scarcely a single branch of biological investigation that remained unaffected by it.

To put the facts clearly before you, permit me to state concisely the theories—for they were theories, absurd and wild—generally held concerning the development of the body, especially of its various organs, and of the source of pathological tissues in these organs and of the cause of disease. First, it was accepted that each composite body was a physiological and anatomical unit, and that the blood was simply a fluid circulating through the vessels, but was no part of the body proper, not dependent upon the remaining tissues for its origin or continuance. Second, that there were homogeneous substances in the body from which various organs were developed *de novo, i. e.,* these substances had the power to develop organic structures, although they possessed no organized parts. That the tissues were made up of fibres, as one school, claimed, and, as taught by another school the ultimate elementary unit of bodily structure was minute globules, the arrangement of which in line led, they claimed, to the misinterpretation of the other school, which could see only the fibers but not the minute globular elements. That disease was explained by two different explanations, one claiming that various humors were taken into the blood from various sources and that these humors by their elective affinities were capable of causing disease in one organ or tissue or another; the other was the solidistic, or neuro-pathological, school, who accepted the body as made up of a great number of parts which were united into a single machine by the nervous system, which was considered to be a simple unit; and that by perversion of its activity all the processes of disease were called into being. That tumors were the appearance of a parastic extraneous growth in the body tissues, which had no ancestral connection with the tissues themselves.

Virchow began his investigations, and with a tireless, ceaseless energy pursued them until he was ready to astound the medical world by a series of lectures delivered in Berlin in 1858, and published subsequently in a volume entitled "Cellular Pathology," the doctrine of which he was pleased to summarize in the expression, *omnis cellula e cellula,* which is, so far as a just comprehension of pathological facts is concerned, the most important expression that the mouth of genius has ever been permitted to utter.

Relative to the doctrine already enumerated, Virchow taught that the body was not a unit either in the physiological or pathological sense, but an aggregation, a society of units, and that while the body might manifest a variable macriscopical size, the unit was a microscopical cell. That, however, much an aggregation of cells might be said to live, nevertheless life resided in the cells individual-

ly, and the life of the body could be said to exist only when the life of these cells remained intact. To quote his own words: "Hence it follows that the structural composition of a body of considerable size, a so-called individual, always represents a kind of social arrangement of parts, an arrangement of a social kind, in which a number of individual existences are mutually dependent, but in such a way that every element (cell) has its own special action, and, even though it derive its stimulus to activity from other parts, yet alone effects the actual performance of its duties."

Such teaching might seem to the layman a very nice bit of information; to the physician it means revolution, the overthrow of all previous theories of disease and the inauguration of a new era founded on accurate understanding of the actual structures and actual workings of the normal body. If the normal body is cellular, then the diseased body is one in which a greater or smaller number of cells are diseased, and the effect produced on that body will depend on the number of cells affected, the extent of the affection and the importance of those cells in the particular business of maintaining a normal body vitality. The cell might be affected in a chemical way so as to pervert or suspend its function, or it might be destroyed and be replaced by the remaining wreckage. It might be stimulated into an unnatural activity or an excessive rate of multiplication; it might be so altered in its characteristics as to multiply with an unnecessary rapidity, cease to perform its normal, take on an extremely abnormal function, and sacrifice everything in its vicinity and remotely to this perverted tendency, making a malignant tumor, which in a few months deprives the body of its right to live. All these things and many more might come to pass, but it was not the bone or brain or muscle that was affected, it was the cell. Multiply the affection of the single cell by the number of cells affected and the product is the extent of disease. Add the importance of the cells affected to the danger of spread to other cells and your sum is the prognosis of disease. Hence when one is poisoned it is not the man as such that is affected, but a certain indispensable minority of the cells, one group, with one set of symptoms for one poison, for another another. The patient is delirious and quiet in one case of poisoning, as that coming from typhoid fever, another is conscious, but torn by such muscular contractions as Hercules could never have known in his severest efforts. One is manifsested locally and another generally, dependent upon the local action of the poison and the local or general function of the cells. So the guessing ceased, the study of medicine assumed an intelligent role, and was based upon an accurate observation of what the human body is normally, what its development from earliest individual existence has been, what influence disease has upon the tissues, and how this influence is exerted. Man is one cell at his beginning; this cell multiplies and he remains a group of cells until age and disease finish his life by affecting these very cells, sometimes adding to, sometimes subtracting from, always altering them. The whole of the medical world has thus come to constitute what may be known as the Virchow School.

Much of the subject-matter embraced in cellular pathology was known prior to the time of Virchow's beginning, and much of it had been discovered by his contemporaries. But none had advanced far enough, no one was seer enough, no one had gathered sufficient information and practical interpretation of the phenomena of life in health and disease, to place the isolated facts into such relation to each other as to establish a basis for all subsequent pathological investigation. When Virchow's lectures were delivered there was a strange admixture of the old superstition and scholastic theorizing and the isolated new facts: they made an unharmonious jumble, an enigma beyond the understanding of any,

incongruous, incomplete, unsatisfactory. Virchow separated the true from the false, because he conceived first the idea that every cell comes from a preceding cell. He placed pathology, the science, on a foundation which could be properly represented by pathology, the word. Every cell comes from a preceding cell, is the offspring of a preceding cell, and every pathological change was a modification of the cells, either macroscopically, microscopically or chemically, and hence pathology was a comprehensible thing; when once the normal processes were understood, the abnormal findings of disease could be compared with them and causes adequate to produce such changes could be intelligently sought. The mystery of disease was gone, and it became a matter of chemistry and physiology. A tissue was found to be diseased, and accepted as a sufficient cause of death. No longer was that pathological specimen considered an intrusion from without; it was made up of cells or cell-remains, cells which had developed from the normal body cells, and which had been so acted upon by agents from without the tissues and the body as to cause them either to assume their present pathological state or by an unnatural cell-proliferation to produce this result. Foreign factors might serve as causes; the pathological processes were the result of the interaction of these causes and the normal vital processes. Physicians may not know the cause, they may fail to see how the changes follow, but the great fact is established, that cause and effect are at work here as in the physical and the chemical world; the mystery was destroyed; the humoral and solidistic teachings, therefore, vanished so completely that within a half century the average physician and student of medicine has never heard that such things are a part of the history of medicine; so, too, the dreams of alchemy vanished before the science of chemistry.

May I quote a few illustrations of the details of Virchow's great contribution?

"It may be said that nothing has penetrated less deeply into the minds of all than the cell-theory in its intimate connection with pathology."

"Only since our idea of a cell has assumed this severe form—and I am somewhat proud of having always, in spite of the reproach of pedantry, firmly adhered to it—only since that time can it be said that a simple form has been obtained which we can everywhere again expect to find, and which, though different in size and external shape, is yet identical in its essential constituents."

"Every animal presents itself as a sum of vital units."

"Even in pathology we can now go so far as to establish, as a general principle, that no development of any kind begins *de novo*, and consequently as to reject the theory of spontaneous generation just as much in the history of individual parts as we do in that of entire organisms."

"In the whole series of living things, whether they be entire plants or animal organisms, or essential constituents of the same, an eternal law of continuous development prevails."

"Whilst formerly many other things besides the substance of muscle, as for example, certain forms of connective tissue, were assumed to be contractile, lately the whole theory of contractility in the human body has been withdrawn within the limits of that substance, and observers have succeeded in tracing back nearly all the peculiar phenomena of motion to the existence of minute parts of a really muscular nature."

"A small vein or a small artery can contract only in proportion to the quantity of muscle with which it is provided." "I have called your attention to this point because you can see from it, how a simple anatomical discovery may supply the most important information with regard to physiological facts, which are widely separated from one another, and how the demonstration of definite morphological

elements may at once most essentially contribute to the elucidation of function, which without any such data, would be utterly incomprehensible."

"There is no other kind of heterology in morbid structures than the abnormal manner in which they arise, and this abnormity consists either in the production of a structure at a point where it has no business or at a time when it ought not to be produced, or to an extent which is at variance with the typical formation of the body."

"Everywhere (in pathology) we meet with structures which may in one way or another be regarded as the reproduction of physiological tissues."

"It is only when we conceive the absorption of nutritive matter to be a consequence of the activity (attraction) of the elements of the tissues themselves, that we are able to comprehend how it is that the individual districts are not exposed every moment to an inundation on the part of the blood, but the proffered material is, on the contrary, taken up into the parts only in accordance with the requirements of the moment, and is conveyed to the individual districts in such a quantity, that in general, at least, as long as any possibility of its maintenance exists, one part cannot be essentially defrauded by others."

"This is, I think, the fundamental mistake of the humoralists, the real hinge upon which their errors turn. Not that I doubt at all that a change in the composition of the blood may pertinaciously continue or that it may propagate itself from generation to generation, but I do not believe that it can be propagated in the blood itself and there persist, and that the blood is the real seat of the dyscrasia."

"My cellulo-pathological views differ from the humoro-pathological ones essentially in this, that I do not regard the blood as a permanent tissue in itself independent, regenerating and propagating itself out of itself, but as in a state of constant dependence upon other parts."

"Every dyscrasia is dependent upon a permanent supply of noxious ingredients from certain sources."

"The lymphatic glands used to be regarded as coils of lymphatic vessels."

"At the present moment there is, I should suppose, scarcely an histologist who believes in the perfect continuity of the lymphatic vessels throughout the gland."

Concerning pus absorption he states:

"This matter finds its simple solution in the fact that pus as pus is never reabsorbed."

"Secondary glandular swellings show themselves in various forms after peripheral infection. How can they be explained otherwise than upon the supposition that every contaminating (miasmatic) substance, which is to be regarded as essentially foreign, or if I may so express myself, hostile to the body, by penetrating into the substance of the gland produces in it a state of more or less marked irritation which very frequently increases to a real inflammation of the gland."

"If now we briefly sum up what I have laid before you concerning the blood, we see either that certain substances find their way into it, which exercise an injurious influence upon its celular elements and render them incapable of performing their functions; or that from a definite point, either from sources external to the body or from some organ, matters are conveyed into it, which thence exercise an injurious influence upon other organs; or finally that its constituents are not replaced and regenerated in a regular manner. Nowhere in this whole series do we find any one condition, indicating that definite changes once set on foot in the blood itself can be permanently maintained; in other words, that a permanent dyscrasia is possible, unless new agencies derived from a definite source are continually brought to bear upon the blood. This is the reason why I began by calling your attention to this point of view, which I con-

ceive to be of extreme importance in practice also, namely, that in all forms of dyscrasia the chief point is to search for this local origin."

I might continue such quotations of Virchow's original discoveries until the subject grew tiresome; it would not be exhausted in a single evening. These foundations were laid and the era of what is known as modern medicine was inaugurated. Pathology, disease, therapy were all accepted as comprehensible things and progress became possible. As a direct result of Virchow's studies a new impetus along a definite course was given to the study of disease, and consequently the progress of our science has been greater since the publication of these lectures than during its entire previous history.

Of Virchow the statesman, the man, the son, I shall not speak. I simply wished to place before you something of the greatness of perhaps the greatest mind whose energies were ever directed toward the study of medicine, the equal of any in any field of thought. His name may be forgotten and his honor slighted by unappreciative generations whose very life is largely made tolerable by his work; but so long as disease must be warded off or healed by a proper understanding of its processes, that long the lifework of this man will make its impress on the practice of medicine. It is given to few to study, to see, to think, to understand, to teach as Virchow did, and as a final word from Vanderbilt University to you, her sons, I bid you to cultivate the application of your minds to your work with the same zeal, the same honesty as Rudolf Virchow did; for in the annals of medicine none have been greater than he.

146 *Eighth Avenue, North.*

IMPROVED DIAGNOSTIC METHODS IN KIDNEY SURGERY.

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Modern diagnostic methods, to which we owe so much in clearing up obscure medical and surgical diseases, have nowhere shown their usefulness to greater degree than in the accurate diagnosis of lesions of the urinary organs.

From the kidneys down each ureter to the bladder, and thence outward through the urethra, we receive a mixed urine which may receive pathological products at any point or at many points along this extensive tract.

Many of the diseases which attack this system are painless, and our first intimation of trouble may be the discovery of some abnormality in the urine, which, as we have said, comes to us mixed from two kidneys through a long and complex canal which is lined throughout with mucous membrane.

Certain diseases, while associated with pain, may have the pain so referred that the seat of the lesion causing it may be, by ordinary methods of examination, impossible of detection.

Some other diseases may, by the presence of pain, tenderness and tumor, definitely indicate that the kidney is the seat of trouble, still, without special investigation, we do not know positively that there is another kidney, and still less do we know of its probable functionating capacity or its ability to carry on the vital functions if its obviously diseased fellow is removed.

Limiting this discussion to the diagnosis of surgical diseases of the kidney and upper urinary tract, we find that every investigation presents the following problems:

1. The location of the part of the urinary system which is the seat of the disease.

2. The determination of the nature of the disease.

3. The demonstration of the presence of a second kidney and the determination of its functionating capacity if the removal in whole or in part of its fellow is contemplated.

The solution of these problems necessitates the most careful history taking and general physical examination, in addition to which the operator must be possessed of a certain instrumental equipment, must be skilled in the use of his instruments, and must have the laboratory facilities for making chemical and physical functional tests and bacteriological examinations.

The special instruments necessary are, cystoscope, ureter catheters, radiographic ureteric bougies and the X-ray machine.

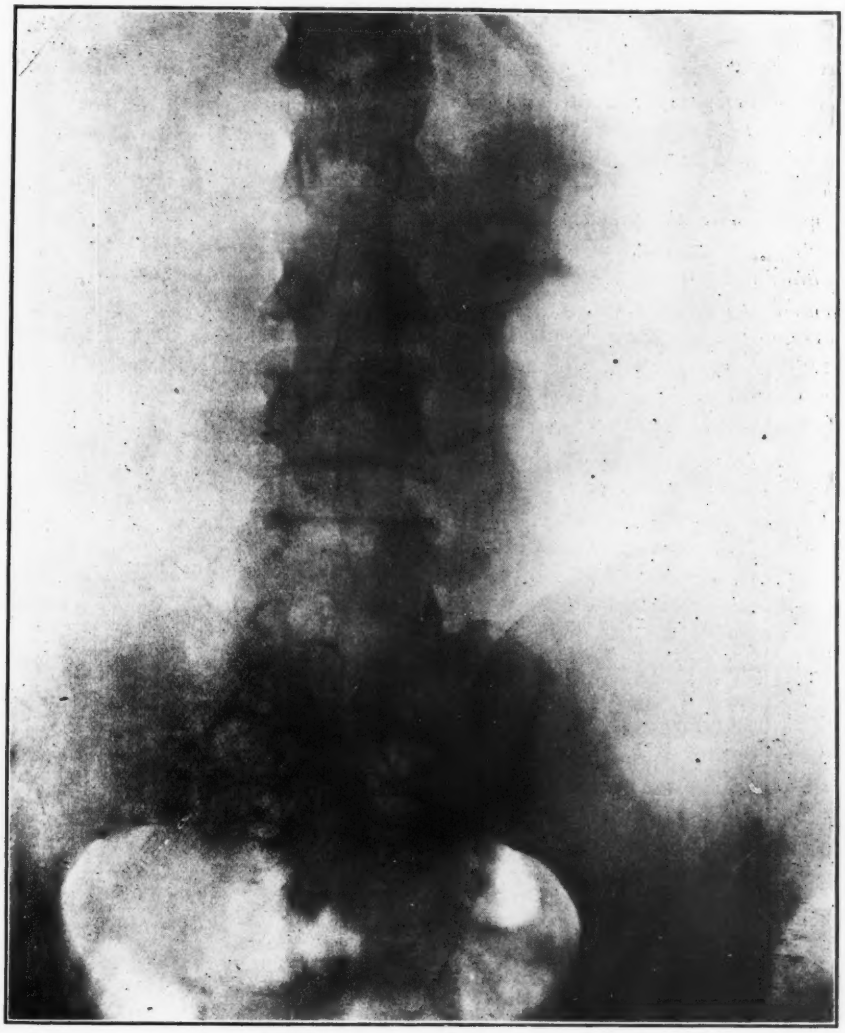
Renal Calculi. Case 1.

Through the use of these instruments the condition of the interior of the bladder and the ureter mouths may be determined; the presence of stones, tumors, ulcers and diverticula may be demonstrated; urine may be collected separately from each kidney for comparative examination, and X-ray pictures may be obtained which are capable of demon-

strating stones anywhere in the urinary tract.

With radiographic catheters in each ureter much confusion in the interpretation of X-ray shadows may be cleared up, in that we are able to exclude those shadows cast by phleboliths, enteroliths or calcareous glands in the neighborhood of the ureters. Especially is this true if we make use of stereoscopic radiographs.

The whole outline of the ureter and kidney pelvis may be distinctly photographed by the previous injection of solutions of collargol through the ureter catheter.



RADIOGRAPHIC CATHETER IN URETER. CASE 2.

Chemical and bacteriological investigation

of the separated urines, together with animal innoculation, gives further invaluable information in certain cases.

CYSTOSCOPY AND URETERAL CATHETERIZATION.

The widely known method of Kelly, consisting of the passive dilatation of the bladder with air and its illumination by reflected light, is applicable to the female and will not be discussed.

Other methods, applicable alike to both sexes, with water as the dilating medium, and with electric illumination in the beak of the instrument, have vastly broadened the field of cystoscopy, and have practically displaced other methods.

One will find ureters in both sexes difficult or impossible to catheterize, but with water dilatation and the irrigating cystoscope, there is but little if any more difficulty in catheterizing the ureters in the male than in the female, provided the male urethra is not so occluded by stricture or prostatic disease as to prevent the introduction of the cystoscope.

The two principal types of instruments using water as the dilating medium are those with direct view and those with indirect view. In the former, one looks directly into the bladder through the tube of the cystoscope; in the latter one obtains a right angle view through the intervention of a system of lenses.

Each has its advantages, and ether is good in the hands of one familiar with the particular type.

FUNCTIONAL RENAL DIAGNOSIS.

The determination of the functional capacity of the kidneys separately is one upon which physiological chemists are still engaged.

Cryoscopy of the blood and urine, the determination of the electric conductivity of the urine, the comparative urea elimination, the elimination of coloring matters such as rose analin, methylene blue and indigo carmin; the elimination of sugar following the injection of phloridzin, are among the tests which have been most extensively tried and which have given proof of the greatest reliability. The phenolsulphonephthalin test recently introduced by Geraghty has proven very trustworthy.

Some of these tests are too complicated for ready application and will hardly become popular with the general surgeon. Others, for example the phloridzin, the indigo-carmin, and the Geraghty tests, are easier of application, are generally considered reliable, and should be made use of by those engaged in this work.

TECHNIC OF CYSTOSCOPY AND URETERAL CATHETERIZATION.

I generally use the Elsner instrument, an irrigating cystoscope, as follows:

The urethra is anesthetized with a few droppers full of 10 to 15 per cent solution of cocaine, which is allowed to run out after a few minutes contact with the mucous membrane. In the male a two-thirds grain alypin tablet is placed in the posterior urethra with the Bransford Lewis depositor. The urethra is dilated up to 26 with ordinary steel sounds, or, in the female, with Kelly's conical dilator. The cystoscope is lubricated and inserted. The bladder is distended with lukewarm salt or boric acid solution.

Very warm solutions are not used for two reasons, the patient is sometimes made uncomfortably warm by the presence of the hot solution in the bladder, and the catheters are made too soft and flexible.

After filling the bladder the light is turned on and the mucous membrane is systematically inspected, continuous irrigation being carried on. Ulcers, stones, hemorrhagic spots, growths, diverticula, etc., are readily detected. The ureteral mouths are located and their appearance noted and compared.

Familiarity with their appearance in health and disease should be acquired, for much valuable information can be obtained concerning the condition of the kidney and ureter above by observation of the ureteric meatus.

If catheterization is contemplated, the ca-

theter is introduced into the tunnel, the opening is brought as close as possible to the ureteral opening and the catheter is pushed directly into the ureter and is passed as high as may be desired. The cystoscope is now turned slightly to the other side, the other ureter mouth is located and the second catheter is passed in the same manner. A few inches of the catheters are then fed into the bladder and the cystoscope is withdrawn, leaving the catheters in place.

The separated urines may now be collected over periods of several hours if necessary, during which time the patient may be made comfortable in bed, with some one to watch after the proper reception of the urine.

Ordinarily the operation may be carried out in the male or female without general anesthesia, but, as a certain amount of distension of the bldder is essential for the success of the examination, general anesthesia will be sometimes found necessary in nervous individuals or those with irritable and intolerent bladders.

If X-ray photos are desired, radiographic catheters or bougies should be used, and in the photograph the course of the ureter is distinctly marked.

With the catheters in place, phloridzin may be injected or any of the color tests may be applied. To the separated urines may be applied any or all of the functional tests and the comparative chemical and microscopic composition may be determined.

Through the catheters may be injected collargol for photographing the ureters and renal pelvis, or antiseptic irrigations may be made for therapeutic purposes.

THE FUNCTIONAL TESTS.

A description and discussion of the various functional tests would unduly prolong this paper. Their full elaboration may be found in the excellent works of Walker and Garceau, and in the writings of Thomas, Geraghty and others.

Brief allusion to the technic of the simpler injection methods may perhaps be admissible.

Phloridzin Test.—Thirty minims of freshly prepared 1-400 watery solution of phloridzin are injected subcutaneously. In health, sugar appears in the urine in from fifteen to thirty minutes, the elimination is at its height in three-fourths to one hour, and ceases in from two to two and a half hours. The total quantity eliminated varies between one-half and two and one-half grams.

TUBERCULOUS KIDNEY. CASE 4.

Indigo-Carmin.—On account of the promptness of its appearance, the intensity of its color, its reliability, and its simplicity, this test presents advantages over many of the others. It is valuable both as a functional test and in chromocystoscopy.

Four cc. of 4 per cent or 20 cc. of 4 per cent solution of indigo-carmin in water are injected subcutaneously or intramuscularly. In 90 per

cent of normal kidneys the drug is eliminated in seven to fourteen minutes. In only 10 per cent of cases is the elimination delayed to twenty minutes. As elimination begins, a distinct and rapidly deepening blue or bluish green color is taken on by the urine. It is decolorized by purulent alkaline brine.

If the blue appears later than twenty minutes the function is probably impaired. If it does not appear at all there is a grave renal lesion.

Thomas states that between 1900 and 1906 the mortality in the University of Pennsylvania Hospital from insufficiency of the second kidney following nephrectomy was 16.6 per cent, and that in the past two years, since the employment of the newer diagnostic methods, where there has been opportunity for carrying out the indigo-carmin test, there has been no death from this cause.

CHROMOCYSTOSCOPY.

It sometimes happens that the bladder is so shrunken or ulcerated that the ureteral openings cannot be located, and at times one may not be able to introduce the catheter. In such cases chromocystoscopy, or "color cystoscopy," is of great value. The deep blue urine may be seen to issue from a certain spot in the bladder wall and at once the ureter mouth is located. If it is impossible to pass the catheter, the presence of two functionating kidneys is established if the two streams of colored urine are seen emptying into the bladder. The time of appearance of the color from both sides may also be noted and the probable condition of function of the two kidneys may be determined from that observation.

Geraghty's Test.—The following is abstracted from the description of the technic as found in Pilcher's Practical Cystoscopy:

"One cc. of phenolsulphonephthalein solution, containing 6 mg. to the cc. is injected hypodermically and the ureters are catheterized. Two cc. of 25 per cent NaOH is placed in each test tube and the urine dropping from the catheter is allowed to fall into the alkaline solution. As the first trace of the drug appears in the urine, a faint pinkish color will disseminate itself through the alkaline solution. As the amount increases, the color becomes more intense. In an acid urine the color is a deep yellow; in a strongly alkaline solution the color is purple.

If the kidney is functionating normally, the drug will appear in the urine in less than twelve minutes. If it takes longer than this, the kidney function is impaired.

Brief accounts of a few cases will illustrate the value of these methods of examination:

Case 1.—Quiescent stones in right kidney. Mrs. M., white, aged 54, has been in failing health for the past five or six years. Recently she has had occasional rises of temperature, associated with sweats, loss of appetite and development of anemia. She consulted Dr. Lull, who found a large tender right kidney together with pus in the urine. She was taken to St. Vincent's Hospital for examination.

On cystoscopic examination we found the mucous membrane of the bladder around the left ureteral orifice quite normal and the catheter was easily passed.

The mucous membrane surrounding the right ureter was extensively ulcerated and corrugated and the catheter could not be introduced. Indigo-carmin was injected, but gave a very poor reaction from each side.

An X-ray photograph, taken by Dr. Edmonson showed a very large stone and some smaller ones in the right kidney. She has not yet submitted to operation, and should she decide to do so, further functional tests of the left kidney should be made before one would feel justified in removing the right kidney.

Case 2.—This is simply a photograph by Dr. Edmonson showing a radiographic catheter in the ureter of a young woman in whom we suspected a kidney stone, but in whom the X-ray did not show any, and in whom other

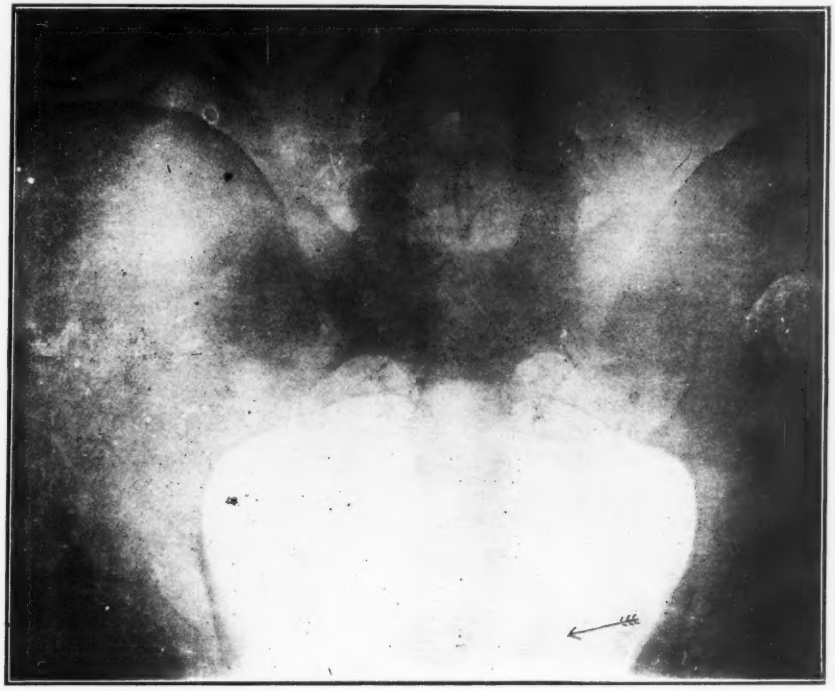
tests proved the urine and the kidney function to be normal.

Case 3.—Suspected horseshoe kidney. Photograph of kidney pelvis filled with collargol solution.

This was a patient of Dr. Drennen, whom, by attempted bilateral nephrotomy for suppression of urine, he had demonstrated to have only one kidney. A large hydronephrotic sac was present on the right side and a fistula persisted following the nephrotomy. A horseshoe kidney was suspected. We cystoscoped the patient, easily located the right ureter, but could find no evidence of a left ureter. The pelvis of the right kidney was filled with collargol solution through the fistula and a photograph was taken. This demonstrated a large sac on the right side, but the shape of the pelvis and its confinement to the right side of the spinal column did not indicate that there was a horseshoe kidney. Unfortunately, the plate in this case was not sufficiently clear for good photographic reproduction. The fistula has since closed.

Case 4.—Left renal tuberculosis, with symptoms referable only to the bladder.

S. T., white female, aged 11 years, began to suffer in the summer of 1909 with frequent micturition. This was painless and for a long time without effect on her general health. In March, 1910, she became much worse, was confined to bed, and the tenesmus was very intense and distressing. She had no pain whatever in the region of either kidney.



Stone in Lower Ureter. Case 6.

I was consulted in June, 1910, and found a well nourished and rosy-looking girl, without fever or anaemia, and whose only complaint was vesical irritation.

The urine was pale, increased in quantity,

was acid, contained pus, and a few red blood corpusles.

A carefully secured specimen was sterile on ordinary culture media. X-ray showed that no stone was present in bladder or kidney. A stained specimen of the pus showed tubercle bacilli. Well knowing that tuberculosis of the bladder is practically never primary, we were confronted with the problem as well as the left aspect of the trigone the mucous membrane was red and superficially ulcerated. The catheter introduced into the right ureter withdrew normal urine, while that from the left side brought away about half a dram of pus. This contained a large number of tubercle bacilli.

The indigo-carmin injection gave a prompt reaction from the right side, showing a healthy

Case No. 7. Occlusion of Left Ureter by Stone Impacted in Upper End.

of locating the primary focus in the urinary system. There was absolutely no subjective or objective symptom to indicate that either kidney was diseased, and there was no evidence of tuberculosis anywhere else in the body. The temperature was not elevated and the child presented the appearance of good health.

Cystoscopy showed the region around the right ureteral orifice to be healthy, but around the left orifice and the left lateral bladder wall function from that kidney, while the reaction from the left side was barely perceptible after an hour's watching.

This definitely located the disease in the left kidney and the indigo-carmin gave us the information that the right kidney was in good functionating condition.

Removal of the left kidney with about two inches of its ureter showed the kidney and ureter to be the seat of extensive tubercular abscesses. She has gained 33 pounds in

weight up to the preesnt time, and has been in the best general physical condition ever since. Cystoscopy performed a few days ago shows great improvement. The existing inflammation is confined to the region of the left ureteral mouth and the right orifice is perfectly clear and healthy.

She has never at any time showed any evidence of impaired renal function, and, unless the disease attacks the other kidney, will probably entirely recover.

Case 5.—Chromocystoscopy in the diagnosis of occlusion of the right ureter.

Patient suffered from an enormous uterine fibroid, during the removal of which the right ureter was divided just above the pelvic brim. It was anastomosed at once. The patient made an uninterrupted recovery, without any sign of urinary disturbance. Before discharging her a cystoscopic examination was made for the purpose of ascertaining the condition of the injured ureter. Both ureteral openings were easily located, but the catheters could only be advanced about an inch. Finding that catheterization was impossible, indigo-carmin was injected. Within fifteen minutes the urine from the left side was deeply colored, and every few seconds gave out a jet of dark blue urine, reminding one very much of the smoke puffed out by a locomotive.

The bladder was observed for more than half an hour, and at no time was any urine ejected from the right ureteral orifice. Either the pressure of the tumor had caused this kidney to stop secreting previous to the time of operation, or there was occlusion of the ureter at the point of anastomosis with subsequent suppression of kidney function. There was certainly no leakage at the point of anastomosis.

Case 6.—Stone in right ureter.

This patient had suffered for several days with symptoms of impacted stone in right ureter when he came to Dr. Heacock for treatment.

He subjected him to X-ray examination, and the picture showed a stone low down in the ureter. While being photographed he experienced some relief from his pain. He was taken to the hospital for examination, when it was found that the stone had escaped into the bladder. On account of its rather small size we decided to keep him under observation with the hope that the stone would pass, which it did the following morning.

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Case 7.—Occlusion of left ureter by stone lodged in its upper end.

This patient, a white male aged about 32, gave history of attacks of renal colic at various times for the past five years. Two weeks before admission to the hospital he had been suffering from colic in the epigastrium and left side of abdomen, slight fever, painful micturition, followed, as the more acute symptoms subsided, by steady pain in the left loin and along the course of the left ureter. He was brought to me by Dr. A. B. Phillips, of Dora, Ala.

The urine was found to be normal, though diminished in quantity. He was prepared for a cystoscopic examination which revealed the following conditions:

The bladder mucosa was normal except for slight congestion about the trigone. The ureteral openings were easily located and appeared healthy. Indigo carmin was injected, and after a few minutes the jets of colored urine were seen coming regularly and normally from the right uretereal orifice, but none could be detected from the left side.

The left ureter was observed for more than thirty minutes, during which time no urine was seen to escape, though the right kidney continued to functionate normally. The ureter catheters were then passed into both ureters and left in position for twenty-five minutes. Colored urine, which, on examination, was found to be chemically and microscopically normal, was collected from the right side,

but no urine whatever was passed from the left side.

From these observations we were justified in making a diagnosis of a healthy right kidney, and an inactive left kidney. These examinations were made at St. Vincent's Hospital, where the X-ray machine was temporarily out of order, so an immediate X-ray photograph with radiographic catheters in place could not be made. The day following, the patient was brought to the city and photographs were made by Dr. Burns.

A stone shadow was found opposite the upper border of the third lumbar vertebra, which corresponds very closely to the junction of the upper ureter with the pelvis of the kidney. The shadow was obtained on three different plates, two of them taken on different days. The ureter below this point was free from shadows.

A diagnosis was therefore made, of occlusion of the left ureter by a stone at or near its junction with the kidney pelvis.

This occlusion accounted for the presence of normal urine, none being passed from the diseased side and the other side remaining healthy.

Though this patient was in a serious state and the dangers of delay in operation were presented to him, he refused operation and left the hospital.

In concluding this paper, I desire to stress two points: For accuracy in kidney diagnosis the cystoscope, the ureter catheter and the X-ray are essential. For safety in kidney surgery, the presence of a second kidney must be demonstrated and its condition must be determined by the functional tests.

THE JEROME COCHRAN LECTURE.*

Some of the Unfamiliar, Atypical Forms and Controverted Phases of Tuberculosis Which Have Been Revealed in Their True Etiologic Light By Recent Investigations.

By RUDOLPH MATAS, M.D.,
New Orleans, La.

(Concluded from September.)

X.

RHEUMATISM AND RHEUMATIC JOINTS OF TUBERCULOUS ORIGIN.

So little has been written in English-speaking countries on the rheumatic or the rheumatoid joint affections of a tuberculous origin, and these appear to form so large a part of the pathology of tuberculosis as viewed by European, and especially French writers, that a cursory glance at the status of this question would appear unavoidable in a discussion of the aytpical and controverted phases of the tubercular process.

The term tuberculous articular rheumatism (pseudo reumatismo articulare da tuberculosi) originated, according to Melchior, with Grocco, the Florentine clinician, in 1882. The word "rheumatism," or "rheumatic," he used to distinguish a form of joint disease which occurs in tuberculous patients which is altogether different from the white swellings and fungous joints, by the fact that the rheumatic tuberculous joint is not characterized by the formation of tubercles with a progressive tendency to degeneration, ulceration and destruction of the joints and the formation of cold abscesses, etc. The word "rheumatism" conveys an idea of a primary, acute or chronic

*The Jerome Cochran Lecture of the Medical Association of the State of Alabama, Montgomery, Ala., April 19, 1911.

process attacking one or more joints and associated with fever and other constitutional diseases. It also conveys the idea that the joint affection is not associated with specific histologic lesions, but that the tissue changes are those common to all inflammatory affections which do not lead to suppuration and progressive destruction of the articulation. "Rheumatism" also implies an underlying general or constitutional process, or diathesis, of which the joint disordered is only a local expression. Furthermore, the rheumatic joint is, in a general way, amenable to medical or internal remedies, whereas, the tuberculous white swellings, from the onset, require local treatment, and are strictly surgical.

Without attempting to enlarge upon the definition of the word "rheumatic," as this would tend to endless digressions, suffice it now to state that Grocco merely intended to call attention to a comparatively rare group of cases characterized by an acute polyarthritis, which resembles acute articular rheumatism in every way, but differs from this in certain peculiarities, such as a sluggish course, rebelliousness to the salicylates and the usual anti-rheumatic remedies, and by its markedly deleterious influence upon the general health. Grocco noted that these patients were either already manifestly tuberculous when the joint lesions appeared, or that some other unmistakable signs of localized tuberculosis developed outside of the joints in the course of the articular disease. He, therefore, concluded that this particular type of rheumatism owed its origin to, or was asociated in some way with, a general tuberculous toxemia.

The Italian writer's observation had almost been lost sight of when Antonin Poncet, Professor of Surgery of the University of Lyons, revived the subject in 1896, and has since never ceased, by his untiring and strenuous efforts and those of a host of enthusiastic followers, to plead and argue for a wider recognition of the prevalence and importance of this form of joint disease, which, in consequence, is often associated with his name as "Poncet's rheumatism" (le rheumatisme de Poncet).

According to Poncet, rheumatism as manifested in the joint is often the first evidence of a latent tuberculous affection, or of a tuberculous process outside of the joints, which becomes apparent, sometimes, long after the appearance of the joint symptoms. An individual predisposition or diathesis is usually a part of the patient's history. In the majority of the cases it is impossible to prove by histologic or bacteriologic tests the tuberculous origin of the joint manifestations, as they are often secondary to very attenuated or comparatively inactive foci of infection. He believes that the joint lesions are, in the majority of cases, of purely toxic origin. It is, therefore, not easy or always possible to demonstrate the presence of the bacillus in the exudates, or effusion, or to demonstrate the presence of the typical tubercles at the necropsies. Sometimes the joints gradually undergo a transformation from the purely rheumatic type to that of a chronic white swelling with its characteristic evolution and the attendant destructive changes. Then the diagnosis is unmistakable.

Tuberculous rheumatism may appear either in an acute, sub-acute, or chronic form. It may localize itself in one, in several or in all of the joints simultaneously. It may be a flitting arthralgia, a mere soreness, a dropsical synovitis, or it may persist as a hypertrophic or atrophic arthritis. It may present itself as a progressive polyarthritis deformans, or as a dry senile arthritis (Morbus coxarius senilis). The acute, as well as the chronic, form of this type of rheumatism may end in ankylosis. Many cases of spinal rigidity, spondylosis, scoliosis, painful flat foot, genu valgum, coxa vara, and even certain cases of dry otitis media with ankylosis of the ossicles of the ear, and, in fact, all the osteo-articular affections of childhood and adolescence associated with defective osteogenesis, may owe their origin to the disturbing influence of a latent or obscure tuberculous toxemia.

The most benign of the tuberculous rheumatic affections is a simple arthralgia—a sore or painful joint. There is pain without any objective signs, and yet this is often the precursor of a manifest visceral tuberculosis. The acute and sub-acute forms of the disease are usually confused at the bedside with the manifestation of ordinary acute rheumatism. Nevertheless, the clinical picture of acute tuberculous rheumatism is distinctly graver; there is fever, rapid pulse, profuse sweats and frequent attacks of dyspepsia. This is brought about by associate general infections involving the serous cavities, the pleura, peritoneum, pericardium and the meninges. But in the majority the evolution of the disease is slow and more benign. The joint symptoms appear in successive stages separated by intervals of rest more or less long, and are distributed over various joints ending ultimately in ankylosis. The disease is more often chronic, and many patients either recover altogether or remain permanently crippled or deformed; others die of marasmus or complications from associate visceral disease. Therapeutically, this form of rheumastism is not relieved by any of the usual anti-rheumatic remedies, and is improved or cured solely by treatment which aims at the cure of the tuberculous infection.

According to Poncet and Leriche, the incidence of this rheumatic disease, or of rheumatic joint symptoms in an admittedly tuberculous subject, is far more frequent than our observations in this country would lead us to believe. The thesis of his pupils, Treboneau, Merson, De Mouxy, Valentin and Reynaud, would appear to establish a percentage of five to seventeen of all admittedly tuberculous patients. If the abortive, irregular and atypical joint manifestations are taken into account the statistics of Schneider, Bouveyron and Michel would increase the incidence to over twenty per cent. If this frequent association, or coincidence, of the rheumatic, or rheumatoid diseases with tuberculosis, should be confirmed by further observations, this alone would suggest the probability of a casual relation.

From the bacteriologic and histo-pathologic point of view Poncet and Leriche classify all cases of tuberculous rheumatism into three fundamental groups, viz.:

Group 1. The acute polyarthritic rheumatic type, which are caused by a massive bacillary invasion of the synovial and other component tissues of the joint. In these cases the presence of miliary tubercles has been amply demonstrated, and there is no doubt or discussion as to the true nature of the disease. This type of tuberculous rheumatism is extremely rare, and is exemplified by the case reported in 1876 by Laveran, which was mistaken for acute rheumatism. These cases end fatally, but if they survive long enough the joints will evolve into typical fungous arthritides, or white swellings.

Group 2. Rheumatic joints which show no specific histologic characteristic at autopsy, no tubercle or granulomata, and yet are identified with tuberculosis by the bacteriologic findings and the biologic reactions of the tissues or fluids of the joints when injected into animals by the reactions to tuberculin, and other general tests which are confirmatory of tuberculous infection. This is a larger and more benign group which is illustrated by the case reports of L. Dor, Griffon, Meylard, Dieulafoy, Barbier, Elbe, Delbet, Millian, Melchior and others.

I have had one impressive experience with a patient suffering from a tuberculous rheumatism which may be classified in this group, and which I will quote briefly, as it will give concrete expression to the generalizations that we have presented:

A young woman, school teacher, aged 29, with a distinct tuberculous heredity, came to me four years ago for the removal of a tumor of the right breast which proved to be, on histologic and bacteriologic examination, a diffused tuberculous mammitis with multiple axillary metastases. She was apparently free from pulmonary disease and also well in every other respect. She recovered from the operation promptly and returned to her country home. In five months she came back still apparently well and active, except for the appearance of a lump in the opposite breast and a chain of small glands in the corresponding axilla and in both sides of the neck. There was then no recognizable tuberculous lesion

in the lungs or internal organs. At her urgent request, and with many misgivings as to the future, I amputated the remaining breast and the involved lymphatic areas in the axilla and neck. She recovered promptly from this extensive traumatism and returned to her home where she lived as hygienically as possible, living in the open air. She was advised at the time to visit the seashore, which she did for several months, returning again to her home apparently improved. I did not see her again in ten months when she again returned showing a new manifestation. The joints of the fingers, wrists, elbow, ankle, foot, had become swollen and, as she expresed it, rheumatic. In some of these there was a distinct effusion with pain and tenderness. There was also a general enlargement of the glands of the groin and outside of the lymphatic areas removed in the previous operation. There was also a slight daily rise in the temperature, which had come on recently, but there was no evidence of visceral localization. Evidently this rheumatic polyarthritis had some relation to the tuberculous infection. I decided to try the effects of extremely small tentative doses of tuberculin T. R. This dose was followed by a mild febrile reaction and a marked increase in the sensibility, tenderness and swelling of the affected joints; there was also a decided general depression. After a period of rest, another dose was given and the febrile reaction was even more marked, though the dose was the same as the first one given, and all the joints again became tender and swollen. After the subsidence of this reaction, a third dose was tried and the same phenomena were repeated with even greater intensity than on the previous occasion. The pain, tenderness and swelling of the joints, as well as the temperature and general depression lasted for a much longer time. As the effects of these injections had assumed a distinctly anaphylactic character, we abandoned the tuberculin treatment and prescribed the Marmorek serum which the patient took by enema. No disturbances followed and the patient returned to her home to rest in the open air in such hygienic conditions as her small means could afford. It is only lately that I learned the details of the final and fatal issue, which was caused by a rapid pulmonary phthisis. The curious feature of the case is that all the joint manifestations subsided shortly after the patient returned home and had practically disappeared long before death occurred.

This termination of the rheumatic manifestations tallies with some of the clinical reports mentioned by Poncet and others, in which the peripheral articular lesions have diminished or disappeared when profound visceral localizations have occurred.

In a case recently reported by Melchoir, in which a girl, aged 19, who had been treated for scrofulous glands in infancy; developed an acute tuberculous osteroperiostitis of the lower jaw, the excision of the jaw and a number of accessary cervical glands was followed in twelve days by multiple acute articular swellings simulating rheumatism and associated with a moderately high fever. Blood cultures showed a tuberculous bacillemia. The joint swellings and rheumatic symptoms persisted for three months, but after a series of periodical remissions and exacerbations the rheumatic manifestations ended spontaneously, a slight thickening in the left knee, alone remaining as a relic of the previous disturbance. Death followed as a result of marasmus caused by localization in the lungs (phthisis) and amyloid disease in the internal organs, spleen, liver, stomach, bowels. The joints on examination showed multiple tuberculous nodules in the synovical membranes of the three articulations which had been previously involved. And yet, the inoculation of guinea pigs with joint fluids, taken *intra vitam,* had proved negative.

Raffin reports the case of a boy of twelve years, who, after the free drainage of a cold abcess in the thigh and the partial resection of a carious public ramus, began to swell in many joints and to suffer from an acute articular rheumatism, which thirteen days later disappeared, leaving the joints normal.

These, and many other cases, could be quoted as illustrations of Poncet and Leriche's second class of tuberculous rheumatism. In cases of this kind there can be no question or discussion as to the tuberculous nature of the joint lesions, and they amply suffice to make us wary in classing as simple coincident rheumatism, the arthritides which appear in the in the course of tuberculous diseases, since they are so often proven to be dependent upon the tuberculous process itself.

It is otherwise with Poncet's *group* 3, in which the joint manifestations are claimed as tuberculous rheumatism, merely through the history of previous or coexistent tuberculous infection, but without any bacteriologic or histologic proof of this relationship. And yet, according to Poncet and his followers, this group is by far the largest of the three. It is about this group that the controversy rages

most fiercely. Firm in his belief that the poisons generated by the tubercle bacillus are alone capable of exciting inflamatory joint reactions and that these toxins may act on the joints through the circulating fluids at a distance from a hidden focus, he easily accounts for the negative results of the bacteriologic examination of the joint fluids for bacilli and the negative result of the inoculation of guinea pigs, by the sterility of these fluids and the absence of inoculable substances. While Poncet has widened our clinical concept of the protean manifestations of tuberculosis and of their ever widening prevalence, and deserves, for this reason, not only the encouragement and gratitude of clinicians, he has, no doubt, gone too far in his generalization, especially when he lays down as one of his postulates that all forms of articular rheumatism, which occur in the tuberculous, are to be regarded, in the absence of other infections, as manifestations of tuberculosis, just as an arthritis, appearing in the course of a gonorrhea is *ipso facto* unhesitatingly attributed to the gonococcus or its poisons. The fallacies of such reasoning when applied directly in practice are too obvious to require discussion. The difference in the two propositions lies in the fact that while no one would accuse a patient of gonorrhea, merely because he had an arthritis, or at least not until the existence of *gonococcus* or of a gonococcal urethritis had been clearly demonstrated,—Poncet would dub as tuberculous any arthritis which developed not only in an obviously tuberculous patient, but also in one who had no demonstrable tuberculosis. It is this tendency to diagnosticate tuberculous rheumatism, merely on suspicion and without proof, that has subjected him to the severe criticism of his own countrymen as attest the Proceedings of the Surgical Society of Paris in 1908, in which Broca, Delbet, Tuffiner and Kirmisson, vigorously objected to his extreme views. Therefore, while we must, as clinicians, fully realize our debt to Poncet and his numerous followers of the Lyonese school, for the new light they have thrown on the nature of many obscure joint affections, which so long masqueraded under the garb of articular rheumatism, we must still hold to a prudent reserve before accepting as proven his, in a large measure, hypothetically tuberculous cases of the third clinical group.

The views of the French conservatives on this subject are well summed up by A. Broca (1908):

"Among the joint affections which have been classed under the general heading of tuberculous rheumatism, whether these be single or multiple, acute or chronic, atrophic or hypertrophic—there are many which can be proven to be tuberculous, but, in any event, before pronouncing them as such, they should respond to at least one of the following tests:

(1) When a so-called rheumatic joint gradually evolves into a typical white swelling. (2) The histologic evidence. (3) The bacteriologic evidence, which is to be obtained by the discovery of the bacillus in the tissues, or in the fluids of the joints; by growing cultures; by the results of inoculation into guinea pigs; by the reaction of the joints to tuberculin, and by the secondary evidence of the general tuberculin tests.

"Tested by these means, the role of the bacillus in the pathogenesis of the so-called rheumatic diseases, has no doubt been enlarged and may continue to be more demonstrable, as our laboratory tests prove, and as clinicians realize the importance of an etiologic differentiation. On the other hand, in the great majority of these so-called tuberculous rheumatisms of the *Poncet type,* no one has yet been able to prove that they *are* caused by the bacillus in a living virulent form. It is quite probable that in the chronic and polyarticular forms the joints are bacteriologically sterile and that the tissue changes are caused by the toxic or trophic influences set in operation by the noxious influence of the bacillus acting primarily upon the nervous system, or on the vascular glands (thyroid, adrenals, pituitary, etc.), which are functionally disordered by tubercular infection. In this very complex

group Poncet and his followers have striven to assign to tuberculosis a great if not the greater, part; but while in principle this is possible, he has not yet established any positive proof of a tuberculous pathogeny and only has called our attention to a frequent association which is not a proof of causation."

XI.

We may also go a step further in the light of the universal diffusion and prevalence of tuberculosis and of our improved means of detecting it and discover that many familiar symptoms and syndromes which are at present ill understood, genetically, may also be the result of acute or slow poisoning with tubercular bacillary products.

This view is not merely tentatively or speculative, but has been acted upon and accepted as a fact by several specialists in tuberculosis such as Josef Hollos, a Hungarian physician who has had an exceptionally large experience in the treatment of tuberculosis at Szeged. In a little book published late last winter on the "Intoxications of Tuberculosis," he presents his views as follows: "When we study the records of the autopsies held on adult individuals we find that in from 80 to 90 per cent. of them, there are evidences of tubercular process, and yet, the general mortality caused by the disease is not over 60 per cent.

The infection is universal; every one of us who has attained his majority, is or has been at some time tainted with tuberculosis, but pulmonary tuberculosis or consumption, on the contrary, develops only in relatively small numbers of the infected. And even the majority of those so infected, only present a small tubercular focus which is so often extinguished completely.

These healed or healing foci are found generally at the apex of the lung, not rarely in the tracheo-bronchial glands. In this last position they usually escape the attention of the observer, the glands being discolored and impregnated with carbon do not reveal to the eye either tubercles or caseations. It is only by careful microscopical examination or by inoculation that the presence of the bacillus can be revealed.* In other cases the pathologist finds the relics of an extinct infection in which an old nodule has been partially calcified in the center and in the periphery of which a number of small caseous nodules are recognizable which demonstrate their tubercular origin.

*The living bacilli have been found in the apparently healthy abdominal and mesenteric lymphatics (Piccini, von Behring, Bartol and others), in the seemingly normal marrow of the long bones. (L. Dor, Arloing, and others).

In line with the argument advanced by Hollos and other clinicians, the recent studies of Rabinowitsch, E. Schmitz, and Wegelin, are of special interest. The researches are admirably summarized by an editorial writer in the Journal of the American Medical Association (May 6, 1911, Vl. LVI, No. 18, p. 1333) and are so apropos of the present discussion that they are worth quoting. The investigations above referred to have demonstrated "that the tubercle bacillus has remarkable powers of resistance which permit it to remain viable in the tissues of the host for great lengths of time and even without producing lesions. It may be recalled that various investigators who have injected material from the lymph glands and tonsils of cadavers into guinea pigs, have produced tuberculosis in as high as 20 per cent of the animals, although the glands were themselves free from either gross or microscopic evidence of tuberculosis, and were removed from bodies which showed no tuberculous lesions. Such a condition constitutes a true latent tuberculosis, even although there were no specific tuberculous lesions and its apparent frequency makes us more lenient than we otherwise might be to von Behring's theory that bacilli taken in cow's milk during infancy and remaining latent during youth and adolescence, constitute an ordinary source of tuberculosis in adults. "The cases in which a tuberculous lesion shows anatomic evidence of quiescence yet contains living and virulent bacilli, should be regarded as persistent and latent tuberculosis. Apparently caseous tubercles practically always contain living bacilli, even when their progress has been checked and they are surrounded by a well defined capsule. Until recently it was assumed that when calcification had taken place the lesion had been so long encapsulated that all the bacilli must be dead, but actual investigation has made it necessary to modify this view. Lydia Rabinowitsch injected into guinea pigs material from four calcified lymph glands of stony hardness, and in all cases tuberculosis resulted. E. Schmitz examined calcified nodules from twenty-eight autopsies and could find tubercle bacilli with the microscope in but two; but of thirty-three guinea pigs inoculated with material from as many calcified nodules, no less than thirteen became tuberculous.

As was to be expected, positive results were obtained much more frequently with material from the chalky or caseo-calcareous areas (75 per cent) than with those of stony hardness and presumably

greater age (27 per cent positive). An important fact is that tuberculosis produced by such inoculations was of a mild character. Only one of the infected animals dying spontaneously from tuberculosis. By use of the new alkaline hypochlorite method, Wegelin has been able to demonstrate the tubercle bacilli much more frequently in calcified lesions, in each of three chalky and in four of ten, hard calcified nodules, bacilli being found.

We must therefore conclude that even when a tuberculous lesion has become encapsulated and calcified, it is still a possible source of danger, since it may contain living tubercle bacilli. Nevertheless, this danger is more potential than actual, for the mechanical protection afforded by the capsule and the lime salts must effectually prevent invasion of other tissues by the bacilli, and we have no observations which indicate that a calcified lesion is often, if ever, the starting point of a fresh infection. Possibly if a suppurating process, or some trauma disintegrated both capsule and lime deposits, the bacilli might be set free, but, even then, serious trouble is not probable, for, as Schmitz's experiments have shown, the encapsulated bacilli are of such low virulence that even the susceptible guinea pig can resist them successfully."

Spengler, in the course of his interesting researches upon tuberculosis, has found the immunizing bodies of tuberculosis in the red corpuscles of the blood of all healthy adults. From that he concludes that all human adults have at some time or other become the host of the bacillus and that for the same reason we all possess a certain but variable immunity against the disease.

But while the body acquires this immunity through its recovery from the first infection, this immunity is partial only, and not always sufficient to protect the individual against repeated massive invasions which may end in a fatal localization in the lungs or elsewhere.

The existence of these old healed or healing foci of tuberculosis is up to the present time only attracting the attention of pathologists and not of clinicians. The latter have only recently begun to suspect their importance as latent foci, since tuberculin has been generally utilized in practice for diagnostic purposes.

"I believe I can assert," says Hollos, "after my personal experience with over one thousand tubercular patients, that these bacillary foci by their toxins or poisons which they secrete and discharge constantly into the circulation, produce through the agency of the nervous system, and especially the sympathetic, a chronic toxic disease which is manifested by the most variable symptoms.

"This tuberculous intoxication may persist many years and end finally by the complete cicatrization of the original focus; it may, however, continue throughout the life of the patient, or may be transformed ultimately into pulmonary tuberculosis of which it is only the first stage."

It is manifested by signs and symptoms which we often misinterpret, and classed generally under the head of anemia, neurasthenia, hysteria and other neuroses. Hollos describes these symptoms as headaches, vertigo, disturbances of sleep, somnolence, restlessness in sleep, irritability, languor and lassitude, exhaustion on mental and physical exertion, vaso motor disturbances, palpitation, tachycardia, morbid flushes, blushing, cold extremities, with sweating; slight oscillation in the daily temperature; repeated epistaxis; gastric disturbances, loss of appetite with nausea and belching, constipation, menstrual disturbances, dysmenorrhea, amenorrhea, hyper-thyroidism, and in addition to all of these, the articular rheumatic manifestations which Poncet and his school have so persistently attributed to tubercular toxemia.

According to Hollos there is no such thing as *latent* tuberculosis, the only latent or still forms are those in which the bacilli are dead, as in the old scars and cretified tubercles. As long as there are any living bacilli, even though incapsulated, they will continue to secrete poisons which will be diffused by the blood stream and affect the nervous system, which is extremely sensitive to their action. He insists upon the importance of the prompt and proper recognition of these signs, because they will often reveal the graver localization of the disease at an early stage, and thus give an opportunity for a treatment which will always be more successful the earlier it is applied.

The discovery of these hidden or occult foci of tubercular activity in the thorax is not easy by any of the ordinary methods of examina-

tion; radiography may facilitate their search and only the reactions with tuberculin may be available to disclose them. However, Hollos believes in testing the origin of these symptoms therapeutically, and for this purpose he resorts to the immunizing bodies discovered by Carl Spengler, of Davos, and obtained by him from the red cells of the blood (Deutsch Med. Woch. 1898, No. 38.) The immunizing bodies of tuberculosis—bacteriolisin and anti-toxin—are extracted from the erythrocytes of the blood of animals which have been immunized against the bacilli of the human and bovine type. This substance in a concentrated form is dispensed as a limpid and colorless liquid which contains a million of bacteriolitic and anti-toxic units, per c. c., plus the immunizing bodies of the most common pyogenic organisms.

According to Hollos, the immunizing bodies prepared by Spengler produce no symptoms whatever, when introduced into the bodies of healthy individuals, even in very concentrated solutions; but in cases of suspected or positive tuberculosis it causes a remarkable improvement in the symptoms,—including a cessation of the fever, cough and all the symptoms of intoxication previously referred to. He uses these immunizing bodies in weak solutions as therapeutic tests, both by inunction and hypodermically. If the patient improves promptly under this treatment he attributes the symptoms to tuberculosis. If they do not, he proceeds with tuberculin and other tests to bring out reactions which are usually negative when the immunizing bodies have failed decidedly to improve the patient.

Without subscribing to or denying the correctness of these statements, I submit them in connection with this dsicussion as suggestive, stimulating, and I trust, encouraging. They show the trend of the times and what we may expect is to come in the diagnosis and the treatment of tuberculosis in the near future.

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THE PRACTICAL VALUE OF THE ROSS "THICK FILM" METHOD IN THE DIAGNOSIS OF MALARIA.*

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The value of the demonstration of parasites in the diagnosis of malaria is aptly expressed by Marchiafava and Bignami as follows: "The certainty of diagnosis in doubtful cases, the positiveness of the opinion which can be given in the presence of complications, represent a conquest of science so valuable that only the physician accustomed to the daily uncertainty and experimentation of practice can properly appreciate it."

Nowhere is the truth of this statement better appreciated than on the Isthmus. For here, or in any other country where malaria is to a great degree endemic, the therapeutic test for a long time has been the only method of distinguishing between some types of the disease when the parasites cannot be found, and the incipient stages of many other febrile affections; and this notwithstanding the lucid differential diagnoses of various authors, as the physician practicing in such localities knows from daily experience. This same experience has taught, I believe, that the absence of parasites as shown by the methods commonly used, cannot be considered as positive evidence of the absence of malaria.

In Ancon Hospital, from January, 1905, to September, 1910, 83,000 cases were admitted. Of these, 41,000 were diagnosed as malaria. Parasites were found in the blood in about 58 per cent of these cases, or 23,410. This large percentage of what we call "clinical malaria," *i. e.*, cases diagnosed as malaria but in whose blood no parasites were found, was due to the amount of quinine taken by very many of the patients before admission. The taking of quinine prior to examination of the blood, however, is a condition met with very frequently in daily practice, and for this reason it will be of interest to the physician who has but a limited amount of time for microscopic work to learn if there be a method of readily finding the parasites in such an instance, if they are present in numbers sufficient to cause fever.

The greater part of our clinical malaria was in mild cases, mostly in patients who had not been thoroughly dosed with quinine before admission, but there were not a few occasions upon which, when the immediate diagnosis was a matter of urgent necessity, no certain information could be deduced from the blood examination. At such times "the uncertainty and experimentation" were as evident in the forming of opinion as before Laveran's discovery.

It has long been a matter of dispute whether or not, in malarial infection, the parasites can be found invariably in the peripheral blood, provided the disease has progressed to a point when the typical symptoms are manifested. Most authorities hold that, in such an instance, a patient search will always demonstrate the presence of the organisms. In other words, if there is fever, the plasmodia are present in numbers sufficient so that one or two of them, at least, will be seen, if the search be continued long enough. But it is not always practicable to make so long a search; frequently, according to some writers, several hours are spent before a parasite is seen, and the busy practitioner has neither time nor opportunity for so prolonged an examination. Any method, then, that in doubtful cases will demonstrate the organisms in much less time than the processes usually employed, and with as equal certainty as in heavy infections, or that will aid in what is

*Read before the Canal Zone Medical Association, May 9, 1911.

equally as important, the positive exclusion of the plasmodia, should be welcomed by those who practice in malarial countries.

Such a method has been developed by Ronald Ross, and was first advocated by him in 1903. In his recent work, "The Prevention of Malaria," Ross presents some figures relative to the proportion between the number of parasites per cubic millimeter requisite for the causation of fever and the number of erythrocytes per c. mm. These figures are of great interest, especially to any who may believe, as I did formerly, that a search of from one-half to one hour in the usual coverglass or slide preparation is equivalent to a thorough examination for organisms.

Briefly, Ross's figures are these (I have amplified his description somewhat, but have not altered his deductions):

With a No. 2 ocular and a 1-12 objective, about twenty fields per minute can be examined. This I have tested, and, in my opinion, it is a very reasonable estimate. If the smear is one erythrocyte thick, as it should be for good work, three hours are required to examine one square centimeter of blood smear. This space, which is slightly more in area than one-sixth of a square inch, would contain 1,250,000 erythrocytes, assuming that each erythrocyte touches six others. The space between the erythrocytes is one-fifth of the total area. Also, Ross deducts an additional 35-65 per cent to allow for the unavoidable spreading of the erythrocytes when the smear is made, also a conservative estimate. So that three hours are necessary to examine 600,000 erythrocytes, if the loss of space between the erythrocytes and in making the smear is taken at 50 per cent

It is now necessary to consider the number of parasites requisite for the production of fever. As Ross states, this is difficult. The susceptibility of the patient to the effect of the infection, the skill and patience of the observer, and the "virulence" of the parasites are mentioned by him as determinative factors. To which should be added, I believe, the tendency of the estivo-autumnal parasites, especially after half-grown, and of half-grown and older tertian parasites, to withdraw from the peripheral blood. For this reason the determination of the number of parasites necessary for the production of a febrile paroxysm should be limited to the number observed at the time of greatest freqeuncy in the peripheral blood. This time is at the beginning of apyrexia, or at the beginning of the remission in estivo-auumnal infection, twelve to twenty-four hours after the initial rise in tertian, and during the second day in quartan. These periods are deduced from many observations, and I believe them to be correct.

Taking all these factors into consideration, Ross believes that it is possible to say, within certain limits, that the number of parasites requisite to produce a febrile paroxysm can be determined with sufficient accuracy to be used as a guide in diagnosis, and recent work in following out his method has led me to the same conclusion. Ross states:

"For a broad general rule we may, I think, accept the principle that if we cannot find parasites after a careful search, their number is not sufficient usually to produce fever."

To this I venture to add, as a corollary, that in intermittent and remittent attacks, the search should be made after the initial rise within the limits that I have assigned, and in continued fever that several searches at different intervals may be necessary, in order to find the parasites at the time when they are present in the peripheral blood in greatest numbers.

What, then, is a careful search, and what is the number of organisms requisite for the production of fever?

As to the latter, Ross estimates it at one parasite to 100,000 erythrocytes. This number, in my opinion, is certainly a minimum estimate. So that to search 100,000 erythrocytes in the films made on slides and coverslips in the usual manner will take half an

hour, as Ross notes. If the searcher is fortunate, he may find parasites sooner; if not, an hour or more may be necessary, and, indeed, as I have previously observed, this latter time is given by authorities of repute as the minimum time required before a preparation may be pronounced negative. However, in a large number of observations, the law of chance will vary but slightly, and a half an hour's work will be the average time necessary.

Now, if instead of looking over one square centimeter, or one-sixth of a square inch of film, this amount of blood can be reduced to one-sixteenth of its former area, it is obvious that a very great saving of time in searching will be obtained. And in this reduction not only is lessened the area to be examined, but the amount of blood is increased by the 20 per cent loss due to the space between the erythrocytes, and the 50 per cent loss in making the smear. So that in each field at least thirty times as much blood as formerly is available for examination. The time required for finding parasites when these are present in the minimum number requisite for the production of fever is reduced from thirty minutes to one. As a matter of fact, in the thicker portions of the film the amount of blood in a field is increased at least fifty times over that in a field of the usual preparation.

From this it is evident that parasites can be found in a short time even when fewer in number than one to 100,000 erythrocytes. If so, then in malaria they should be found whenever there is fever due to the action of the parasites, and not to complications. Whether or not this statement be true, I ask you to determine from the results that I shall present, which results were obtained by the use of the Ross thick film method.

TECHNIQUE.

I give this in detail and at length, for there are many points in it that I found only after much experimentation and practice:

1. A drop of blood, larger than that which, when smeared, would cover the larger part of the usual glass slide, is placed on the slide, and spread until it makes a circle about three-quarters of an inch in diameter. I always make two such smears, one on each end of the slide, for reasons that I shall explain later. I use a platinum loop, such as is used in smearing sputum, but the smear can be made with a pin or with the concave surface of a pen. Care should be taken to spread the film as evenly as possible. The slide is then placed on a flat surface, so the blood will not run, and allowed to dry.

If specimens are taken from more than one patient, the slides should be marked with a grease pencil on the reverse side. When the films are dry, the number or other mark of identification is scratched on the film with a pin or a pen, and the pencil mark carefully wiped from the other side, otherwise the aniline dye in the mark may dissolve in the acid-alcohol used in the next step, and so discolor the film.

2. To 50 cc. of ethyl alcohol of the usual commercial type, ten drops of commercial hydrochloric acid are added. This amount can be lessened or increased according to the strength of the acid. The slides are placed in this solution, and kept there until the hemoglobin is dissolved out of the film. This takes from ten to twenty minutes, depending on the thickness of the film, but the slides may be kept in the solution for several hours, or over night, without damage to the film. When decolorization is complete, the film losses all of its brown color, and apears grayish-white, resembling in appearance ground glass. The acid alcohol, if placed after use in a tightly stoppered bottle, can be used many times, and if economy is necessary, can be re-distilled and used again.

3. The films are now fixed to the slide, and can be handled with ordinary care without fear of their coming off the slides. They are next washed in running tap water for ten or

fifteen minutes. They are in no way injured by a much longer washing, but the time given is quite sufficient. This washing is very important, and must be done thoroughly, for if any trace of acid remains in the films, the parasites will not stain.

4. After washing, the films are dried, either in the air or by blotting. Heat must not be used. They are then stained with any good modification of the Romanowski stain, such as Hasting's, Wright's, or Lieshmann's. The undiluted stain must be kept on longer than on the usual slide or cover glass preparation, in order to give it time to penetrate the thickness of the film. I use a liberal quantity of stain, allow it to remain for two or three minutes, and then dilute with all the water the slide will hold. For the dilution, distilled water only should be used. After a few minutes it is well to dilute again, and in five minutes more to make a third dilution. This is to allow for the loss caused by evaporation, and to keep the stain from precipitating. Two glass rods across a tin or enameled basin make an excellent staining apparatus, which has the advantage that when the excess of water is added, only a few drops of diluted stain flow from the slide, instead of all the stain coming off, which is the case if the slide be placed on a flat surface. The film that forms on the surface of the diluted stain should be kept well broken by the addition of water. When staining is completed, the films are washed in tap water until no more blue color comes from them. One should be careful not to overdo this last step.

If this technique has been carefully followed, the field will appear as a more or less dark pink, against which the blue of the cytoplasm of the parasite, and the red of the chromatin, show quite as plainly as in the usual preparation. The small ring forms of the parasites are seen from many angles, and sometimes only the chromatin dot and a small quantity of the cytoplasm are visible. The larger tertian parasites appear as ragged masses of blue, in which the red of the chromatin can be made out. These are the most difficult of all to identify. Crescents are usually shrunken, but are easily recognized by the appearance of pigment and chromatin in their bodies. Sometimes they are undergoing the changes seen in moist chamber preparations, and appear as round or ovoid bodies, but the pigment and chromatin make the detection of these forms not difficult. Tertian gametes are very distinctive, and are readily recognized. The Quartan parasites are very compact, the cytoplasm takes a dark blue, and when once seen, the older forms are easily recognized. Presegmenting and segmenting parasites offer no difficulty of determination.

It is not possible, in my opinion, to recognize definitely the species of any one ring form. However, if all the parasites seen are ring forms, in all probability the infection is an estivo-autumnal one. In tertian and quartan infections, larger parasites and gametes are almost invariably present, often in considerable numbers.

I wish to add that some practice is necessary to identify the parasites. One should begin with infections of some intensity, the heavier the better, and having identified the species and forms of the parasites in the usual smear or cover glass preparation, observe these as they appear in the thick film. As I have said, owing to the thickness of the film, the small parasites appear at many different angles, and frequently forms are present which can be recognized only with practice. At least, such has been my experience. But after one has attained facility in the recognition of the parasites, the ease with which they are found when a long search by the other method has proven negative, is an ample recompense for the time spent in making the films. Often I have found the parasites in less than a minute when a search of over half an hour in the slide has been negative. I, for one, have no desire to return to the other method.

except for use in the study of the morphology of the parasites. Of course, in this statement, I refer to scanty infections, and the desirability of immediately determining a positive or negative result, in doubtful cases with grave symptoms, for the thick film has no advantage in infections of moderate or heavy intensity. But it is easy to make the film, at the same time when the slide or coverglass preparation is taken, and if search in the latter proves negative, the former is available for a definite diagnosis.

There is, in this climate, some species of yeast or fungus which, when stained, so closely resembles the larger tertian parasites, and often takes on a shape so similar to that of a crescent, that the absence of pigment, with a slight difference in the appearance of the cytoplasm, is the only means of distinguishing this cell from a parasite. When I began this study I was not infrequently misled by the appearance of these adventitious cells, which on damp days are sometimes very plentiful in the air, and settle in numbers on the film.

In making the thick film, Ross advises that a c. mm. of blood be spread over an area of about one-quarter sq. cm. There are 6.25 sq. cm. in a square inch, so that such a film would be about one-fifth of an inch square. But for purpose of diagnosis, a larger and thicker film should be used. The drop of blood that I use contains about 7 c. mm. When this has dried, there is in the center an area thicker than elsewhere, in which the leucocytes are about 40 to 60 to the field. As the usual cover glass or smear preparation seldom contains more than one leucocyte to the field, and very frequently less, the larger amount of blood visible in the thick film is plainly demonstrated. I search this thick area first, and if it is negative in one film, I then search the thick area in the other. I have made several films in the way Ross advises, and have found that a practicable film, much thicker than that made by his method, can be obtained with a consequent saving of time. I should add that Ross recommends the amount of blood used in his method for the numerical estimation of parasites, and not for their demonstration for diagnostic purposes.

Ross advocates washing out the hemoglobin with water, and then staining, or washing out with an eosin solution, and subsequently passing over a weak solution of methylene blue. Each of these methods has disadvantages: in the former, a certain amount of loss is inevitable, and in the latter, not only does this loss happen, but the parasites are not well stained, and the chromatin, which is of great importance in the recognition of the parasites, is not demonstrated. However, in making films for enumerative work, he advocates the fixing of the film prior to decolorization, although he does not give his method.

L. Rogers fixes the film first, and then stains with an alcoholic solution of one of the Romanowski stains. He next washes out the hemoglobin with a weak solution of acetic acid. I have tried this method, and it is open to objection, in that it is very difficult to control the washing to the proper degree, and if the film is at all thick, before it is decolorized the greater part of the stain of the parasites is also washed out.

The method which I have described is free from these objections. The film, if properly made, is entirely decolorized, the fibrin only remains to obscure the field, and this can be removed by picking it out with a pin or pen before the film dries, but I do not advocate doing so, as there is a loss of erythrocytes that contain parasites. In the film, by the method I have described, the fibrin appears in a more or less heavy network, and in the spaces between the erythrocytes are entirely decolorized, and parasites can easily be recognized.

The film is fixed at the same time that it is decolorized, without loss of substance, and I do not find that the parasites are caught in the meshes of the fibrin; on the contrary, the erythrocytes containing them appear to be ex-

truded from the meshes into the open spaces. Peculiarities in the appearance of the parasites are not due to any fault of the method, but occur as a consequence of the heaping up of the erythrocytes containing them. When these peculiarities are studied and recognized, the parasites are as easily detected as in the usual smears.

RESULTS.

I.

The Increased Number of Cases in Which Parasites Are Found.

To determine the value of the thick film process when applied to routine work, examinations were made of the bloods of 100 patients. European laborers employed by the Isthmian Canal Commission, admitted consecutively to Ancon Hospital from April 11 to April 26, 1911, as follows:

Blood smears were taken in the usual manner from each patient on admission, and these were examined by Dr. H. R. Carter, Jr., of Ancon Hospital, and at the same time, and independently, I examined thick films from the same patients. The greatest care was used by Dr. Carter in the examination of the smears, and at least one-half hour was spent by him in searching each smear before it was pronounced negative. The percentage of positive bloods that he obtained was practically as high as that obtained by any other observer in the same class of patients in the corresponding period in former years, thus showing the accuracy of his work. The diagnoses of these 100 cases was made by Dr. W. E. Deeks, Chief of Medical Clinic in Ancon Hospital, and Dr. Carter, and without regard to any preconceived significance of the value of the negative findings in my observations.

For purposes of comparison I ascertained the diagnoses in the 100 cases immediately preceding these, and in each 100 consecutive cases admitted in the same period in preceding years, from 1907 to 1910, inclusive.

I wished to show practical results, and for that reason I limited the time of my examination to five minutes for the thick films from each patient. Table 1 shows the result of this examination:

TABLE 1.

Year	Per cent of 100 cases diagnosed as malaria	Per cent of positive cases	Per cent of clinical cases
1907	75	37	62.7
1908	71	54	45.1
1909	83	63	37
1910	74	55	45
1911, 1st 100 cases	72	60	40
1911, 2d 100 cases, Dr. Carter's examination..	63	60	40
1911, 2d 100 cases, thick film method	63	94	6

From this table it is seen:

1. That the results obtained by Dr. Carter, who examined both the first and second 100 bloods in 1911, were as good as those in any former year, if it be noted that in 1909, when the per cent of the positive bloods in malaria was 63, that the per cent of total malaria in the 100 admissions in 1909 was 83, which was higher than at any other time, and for this reason the blood examinations for that year would show a higher per cent of positive results.

2. That by the use of the thick film method I increased the per cent of the positive malarial cases from 60 to 94, and this increase was due to the fact that parasites were demonstrated in a search of five minutes or less in the thick film, when a half an hour or more of search by Dr. Carter in the usual slide proved negative.

Of the 63 cases diagnosed as malaria, parasites were found in the routine smear by Dr. Carter in 38. I found them in films from all of the cases in which Dr. Carter found them in the smears, and also in 21 additional cases. Crescents were found by Dr. Carter in but one case, and by me in 19 cases.

II.

The Varieties of Parasites Found.

In the thick films parasites were found as follows:

TABLE 2.

Estivo-Autumnal Infections.

Ring forms, or schizonts, only	21
Ring forms and crescents	9
Crescents only	4
Total estivo-autumnal infections	34
Tertian Infections.	
Single tertian	11
Double tertian	5
Single tertian and crescents	3
Double tertian and crescents	2
Tertian gametes only	1
Total tertial infections	22
Mixed Infections, Tertian and Estivo-Autumnal Asexual Forms, or Schizonts.	
Tertian and estivo-autumnal schizonts, and tertian gametes	1
The same, with crescents	1
Total	2
Quartian infection	1
Total of positive infections	59

The 21 infections in which parasites were found by the thick film method only were nearly all in patients who had been taking quinine for several days prior to admission, or occurred as latent malaria in bronchitis, influenza, bacillary dysentery, and indigestion. Parasites were found by Dr. Carter in all cases in which the infection was severe. In one case of hemoglobinuric fever, in which the hemoglobinuria developed twenty-four hours prior to admission, several crescents were found, after a most careful search of the routine smear by both Dr. Carter and myself had proved negative. In all of these 21 infections the parasites were few in number, certainly not more than one to 100,000 erythrocytes, and in most of them, in considerably less than this proportion. The value of the thick film process in picking up latent infections is indisputable. These would have been overlooked and might have relapsed for want of proper treatment, perhaps with serious results.

The large number of cases in which crescents were found is worthy of notice. They were present in 62 per cent of the estivo-autumnal infections, 22.7 per cent of the tertian infections, and in one of the two mixed infections. A more extended search than the allotted five minutes demonstrated that they were presnt in even greater proportion in the estivo-autumnal and the tertian infection. If the thick film method had not been used, but 3 per cent of the estivo-autumnal infections would have exhibited gametes.

Gametes were found in every case of tertian infection. These forms are easily distinguished, as they retain their compact shape, while the schizonts are broken up, probably by the action of the acid-alcohol. This fact has an important bearing on the morphology of the parasite, and perhaps on the problem of relapse, and I shall refer to it in a later communication. Macrogametes predominated to a great extent.

(Concluded next month.)

THE TREATMENT OF PULMONARY TUBERCULOSIS.

By FRANK SHERMAN MEARA, PH.D., M.D.,
Professor of Therapeutics in the Cornell University Medical College, New York.

Year in and year out the Grim Reaper has taken his richest harvest from the soil sown with the seed of tuberculosis.

Figures dealing with the morbidity and mortality of this disease are appalling, and yet how incomplete they must be, how far short of the real truth, everyone must know who appreciates the difficulties in the way of their attainment. One man in ten dies of it; one man in seven dies of it between the ages

of fifteen and forty-four; one man in three dies of it; so run the figures; and how many more are invalided by it or rendered inefficient by it, dying of some other trouble the imagination runs riot to encompass. It is estimated that the economic loss to this country each year is $150,000,000 to $200,000,000 and to the city of New York $23,000,000 from this cause alone.

Now, at last, the world has awakened to the meaning of the great white scourge. Nations co-operate; government gives support; states appropriate money; communities pass laws; philanthropy lavishes and individuals seek to instruct themselves in the struggle against the destroyer. All these agencies are in the process of learning and so but in the skirmish that precedes the battle.

However, already the literature grown up around this subject is enormous, and men are devoting their professional lives to it exclusively, and a specialty is growing up with far more justification than most specialties.

I must in so short an article relegate sanitorium and institutional treatment to the rear, and, remembering that 98 per cent of all cases must be treated at home, and so be treated by the general practitioner, give my time to this class of cases.

The corner-stone in the edifice of phthisiotherapy is instruction, and the title "doctor," meaning the "teacher," should here take on its full significance.

As someone has well put it, we and our patients enter a partnership to conduct a business—the business of getting well—and the success will depend on the knowledge of the details of that business by each and the hearty co-operation by each in the partnership.

Having determined upon a line of treatment, we should explain to the pateint what we are going to do and why we are going to do it. We should explain his duties toward himself, his family about him, and toward his community. All rules should be laid down with precision, and we should assure ourselves that they are understood.

What these rules are will develop as we go along.

Above all, we should bring to the patient comfort, cheer and strength and seek to inspire confidence, fortify determination to get well, and use all those subtile weapons of the mind whose neglect by us has afforded the opportunity for abuse to the charlatan and quack.

The earlier the diagnosis can be made the less the signs of intoxication are manifest; and the less the local damage done the better, other things being equal, will be the prognosis. Such cases, incipient cases with a fair prognosis, are those on whom we shall bestow the most of our attention.

Our treatment consists of air and food, at first with rest; later with exercise. How simple it seems. But by what devious paths and through the mazes of what jungles we have at last come upon this clearing.

Air, fresh air, and plenty of it, is the first consideration.

Where the air may be got may make a difference, and certainly some climates are more inviting to out-of-door life than others, and there can be no gainsaying the value of a change of climate in this disease as well as others, but this change is by no means as imperative as we once thought it, and the knowledge that patients can get well in the air of the locality in which the disease was acquired is one of the most blessed boons that have rewarded the study of this condition.

When we speak of "home treatment," however, we mean treatment in the same climate, and not necessarily in the same house or street, and so as we know that the air of the country or even of the suburbs is purer than that of the city, we seek, if the circumstances of the patient will permit, to remove the family to such a quarter.

The house we would choose would be at an elevation of a few hundred feet—would be a

little isolated from the rest, a little removed from the street, and would have a sunny exposure and as cheery an outlook as we could secure.

Our patient's room should be the largest, sunniest room in the house, and should open out onto a spacious balcony, veranda or porch. We would have this face the south in the winter, and we would like to have its counterpart on the north side in the summer.

This veranda is, after all, to be the real living room of the patient. Here he should spend his days of rest, and here he should sleep at night. The room should serve simply as a place to retire to attend to details of toilet or to escape unusual inclemencies of the weather. The veranda should be a little deeper than high, and should be protected on two sides by glass that may be raised when desired or lowered to afford shelter against high winds and rain, or in summer awnings may be used.

Now, this is ideal, and ideals can be rarely attained, but they are useful goals to aim at. We try with what we have at our command to approximate this.

We can use a tent in the country, move the bed or chair into the yard, build a platform in an angle between the house and ell. In the city we may utilize to some extent the yard if the sun reaches it, or, better, the roof, extension, or even the fire escapes and balconies.

If our patient must be confined to the room, we can at least have the windows open and use a bay window if there be one, and sleeping in a window tent at night offers advantages over the room.

We should like our room, with two windows at least, to be simply furnished, with painted walls and woodwork that can be easily cleaned and hardwood floors. A rug may be used, but not carpets. It may be heated by steam or hot water or by a fireplace.

The room should be made as cheery as is compatible with its purpose.

REST.

There are many classifications of pulmonary tuberculosis, based on pathology, symptomatology and other criteria. Perhaps the best from the standpoint of treatment is that adopted by the National Association for the Prevention and Study of Tuberculosis and practically that used by Trudeau.

1. Incipient cases.
2. Moderately advanced cases.
3. Far advanced cases.

So important are the members of the first group that I feel justified in reiterating here the definition of incipiency adopted by the association. It is: Those cases which show "light initial lesion in the form of infiltration limited to the apices or a small part of one lobe.

"No tuberculous complications. Slight or no constitutional symptoms (particularly including gastric or intestinal disturbances or rapid loss of weight).

"Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours, especially after rest.

"Expectoration usually small in amount or absent.

"Tubercle bacilli may be present or absent."

Moderately advanced or far advanced cases should, of course, have their rest in bed. It is well to put even the incipient cases to bed until we have time to observe them, and certainly, if they have slight fever, until the fever remains normal, under 99 degrees F. at all times of day for at least three days.

BED.

The bed should be made of iron, with a stiff woven-wire spring, a half or three-quarters width, the usual hospital bed being the best. It must be on castors to roll from room to veranda. The mattress should be of hair. The pillows may be used to pro-

tect the head, as two in the shape of an inverted V, with the head at the apex, or one on either side and one across the top of the head. A hood may be worn; in very cold climates sleeping bags and other devices.

When the weather is cold, two mattresses may be used, with paper between to preserve warmth, and abundance of blankets used, or the bed may be made up as in the open-air treatment of pneumonia.*

If the bed stands in the room, it should not be put in a corner, where the air is dead. The head of the bed must not stand in a draught. A bed rest is a necessary adjunct in some cases.

The patient is to be kept in bed until the temperature has been normal for at least three days. The length of time taken to effect this, where it can be effected at all, varies greatly, but in a study of over 700 cases (Burton-Fanning by Brown) it was estimated that 50 per cent lost their fever in a month.

When the patient leaves the bed he is still to pass the greater part of his time at rest in the open air, which leads us to the consideration of his chair and clothing.

The meaning of rest is cessation from work, which may be considered an aphorism. But an aphorism has its uses, and it serves here to call your attention to the fact that a strained, uncomfortable position, by keeping muscles on a tension and compelling fidgeting, is not rest, but work; so that the chair in which the patient reclines is a very important factor in securing rest. It must be roomy, wide, with a movable back, a good mattress, pillows and book-rest.

Brown recommends Detweiler's or the Adirondack recliner used at Saranac, but, of course, there are many others that will answer the purpose.

Clothing should be adapted to the weather. At all seasons underclothing should have some wool in it to take up moisture and preserve an even temperature.

The outer clothing and wraps are important and should be applied with judgment. The comfort of the patient is the best criterion. Blankets, steamer rugs, fur coats, gloves, caps or hoods, cardigan jackets, woolen socks, with or without lisle thread under them; boots and leggings—all play an important part in the cold climates or seasons of the year.

It must be remembered that mental rest is quite as important as bodily rest, and that means that the patient must be sheltered from business cares or other worries, from unnecessary excitement and too many visitors.

EXERCISE.

As soon as the patient is in a condition to receive it he should have exercise. He may have passive exercise, such as massage, even before he is out of bed, but it must be done with rare discretion and must not induce fatigue.

When any untoward manifestations are present, like haemoptysis, high fever or complications, it must be interdicted.

There are four chief contra-indications for active exercise, and, indeed, they should in-

*"Open Air Treatment. In this open-air treatment certain precautions must be carefully observed, more especially in cold weather. The bed is to be made up in a particular way. Over the woven wire is to be spread a blanket large enough to extend below the sides and below the foot. Over this a rubber sheet, or paper, and on these two is laid the hair mattress upon which the bed may be made in the usual way. Then the blanket and rubber sheet are folded up over the mattress and its covers from either side and from the foot and closed after the fashion of an envelope, being secured with pins. The blanket and impermeable sheet protect the patient from currents of cold air sweeping up under the bed and working into the clothes. A hot water bottle should be kept at the feet. The amount of clothes should be enough to keep the patient warm but not over-heat him and the material of the covers should be as light as possible, eiderdown quilts, for example, so that the burden of the clothes shall not embarrass the respiration or cause fatigue by mere weight. The patient should be in a light suit of flannel underclothes with stockings and wear a hood."

New York Medical Journal, January 8, 1910. Treatment of Pneumonia. By Frank S. Meara.

dicate rest in bed—namely, fever, rapid pulse, haemoptysis and rapid loss of weight.

The exercise should consist in walking, best in the morning, and at first on a level. A five-minute walk to begin with, and that slowly, increasing a little each week until several hours are spent on one's feet.

Inclines are not to be attempted until goodly walks on a level can be taken without distress. Later the milder forms of sport may be allowed, but with very great caution.

Lawrason Brown, to whose most excellent contribution on the treatment of tuberculosis in Osler's system I am indebted for much of the detail of this article, advises giving the patients printed rules which run as follows:

(Exercise means walking. Special permission must be obtained before indulging in other forms of exercise.)

None for one week after beginning treatment, then ask about it.

None if feverish.

None if blood in sputum.

None if loss of weight.

None if fast pulse.

Never get out of breath.

Never get tired.

Never run.

Never lift heavy weights.

No mountain climbing.

GO SLOW.

Exercise regularly and systematically, whether rain or shine.

Walk up hill at start so as to come down hill on return.

Remember always that you will have to return.

Rest one-half hour before and after meals.

DIET.

Here is one chronic infectious process in which the necessity for enough food to meet the body needs and make good the ravages of disease seems universally appreciated.

Destruction of body proteid in infectious fevers is due ordinarily to three factors—1. Starvation. 2. Pyrexia. 3. The action of the toxins of the infecting organism.

For the first we are in part responsible by our habit of insufficient feeding.

Of the last two, pyrexia does not exert a destructive action on protein at temperatures less than 102 degrees F. (Linser & Schmid, quoted from Lusk on Science of Nutrition, p. 251), while the toxins may exert their effects at all temperatures. Indeed, this proteid loss may be seen in the early stages of tuberculosis without fever (Lusk, p. 258), and is indicated clinically by loss of weight. Of course, during the height of the febrile period the loss of proteid to the body is much greater, and in a case of acute caseating pneumonia a patient was found to have lost 222 grams of nitrogen or 6,550 grams of muscle flesh—that is, between 14 and 15 pounds. (Von Noorden on Metabolism. Trans. Vol. II, p. 105.) During the decline of the fever the nitrogenous loss is much less, and a nitrogenous equilibrium can be easily attained even in those suffering from a fever of an intermittent type.[1]

Studies of food absorption in tuberculosis during the febrile period show it to be quite as good as during the afebrile period.[2]

Figures seem to show that the nitrogen intake must be liberal to maintain an equilibrium, ranging from 11.6 to 28 grams. With the former figure and 46 calories per kilo, Von Noorden was able to induce a slight storage of nitrogen.

These figures are about the same as were found sufficient for typhoid cases—*i. e.*, about 70 grams of proteid—but in the more acute disease of typhoid fever the calories required to shelter the loss was greater—some 70 per kilo.[3]

1. Kraus in Von Noorden on Metabolism, p. 106.
2. The same. p. 167.
3. Shaffer & Coleman, Protein Metabolism in Typhoid Fever, Arch. Int. Med., Vol. IV.

The so-called "practical man" is wont to rail at the term aesthetic, and yet we are all to a degree aesthetic, or else we were unsuited to the plane of civilization on which we dwell. A thing is aesthetic when it "is fitted to perception," by whatsoever sense it is apprehended. The sick are keenly alive to violations of taste, and disgust and distaste are easily aroused. When the taking of food is of such vital moment, everything about its preparation and serving should cater to its appreciation—good cooking, dainty serving, tempting portions, frequent variety, and, if table companions, those of good cheer.

When the patient is under weight, it may be preferable to feed oftener than in health, giving three meals a day and intercalating three lunches.

When the normal weight is restored the lunches may be omitted. The heartiest meal may conform to the usual habit of the patient.

The most important articles of food are milk and eggs. Meat and fats come next, and goodly amounts of carbohydrates.

The following dietary is one suggested in one of our standard works on tuberculosis. The caloric values are estimated roughly, for, after all, that is all that is needed, and in terms of our usual portions. Servings, of course, will vary somewhat. A glass of milk is six or seven ounces; if eight, it would be filled to the brim. A slice of meat varies, too, and the calories are more or less depending on the fat, but in the long run our helpings will average up. We will try to get an estimate of the proteid value of this food as well. We will put these figures in two columns, as

	Cal.	P. in Gr.		Cal.	P. in Gr.
Before arising.					
Milk, 1 glass (6 oz.)	120	6.30	(7 oz.)	140	7.35
Breakfast.					
Orange, small	50	.96	large	75	1.44
Oatmeal, one serving	65	2.85		65	2.85
Cream, 2 oz.	100	1.50		100	1.50
Sugar, 3 teaspoons	100	0.		100	0.
Eggs, 2	140	14.		140	14.
Lamb chop, 1, small	100	6.	2, small	200	12.
Bacon, small serving	100	1.5		100	1.5
Roll, 1, 1-4 oz., small	100	3.43	2, small	200	6.86
Butter, 1 pat., 1-2 oz.	100	.15	2 pats	200	.30
Milk, 1 glass (6 oz.)	120	6.30	(7 oz.)	140	7.35
Lunch at 10 A.M.					
Milk, 1 glass (6 oz.)	120	6.30	(7 oz.)	140	7.35
Dinner at noon.					
Soup, consomme	15	3.	bean	100	5.
Oysters, 6	50	6.	shad ord. s.	100	6.7
Beef, 1-2 serving (1-2 oz.)	100	3.	whole	200	6.
Potato, baked, 1 good	85	2.2	same	85	2.2
Spinach, ord. serving	85	3.	same	85	3.
Lettuce, ord. 3 oz.	20	1.	same	20	1.
Oil, tablespoonful	135	0.	same	135	0.
Bread, thin slice	50	1.6	thick slice	100	3.2
Butter, 1-2 pat	50	.1	1 pat	100	.15
Tapioca pudding, apple	100	.25	same	100	.25
Lunch, 3 P.M.					
Egg	70	7.	milk	140	7.35
Supper.					
Beef, cold, small	100	3.	large	200	6.
Potato, baked	85	2.2	same	85	2.2
Bread, thin slice	50	1.6	thick	100	3.2
Butter, 1 pat	100	.15	same	100	.15
Milk, 1 glass (6 oz.)	120	6.30	2 glasses	240	12.6
Bed Time.					
Milk, 1 glass (6 oz.)	120	6.30	1 glass (7 oz.)	140	7.35
	2,530	98.		3,630	128.85

supposing one to have a good appetite and the other a keen one.*

The dietary in the book was not worked out in calories and proteid need, but it will be seen that the proteid needs meet the Voit standard of about or a little more than 100 grams, while, if we make our patient weigh 65 kilos, as being an average man who has lost some flesh, he will get 39 calories per kilo from the first dietary and 56 calories per kilo in the second.

The latter more nearly meets the theoretical needs, furnishing enough carbohydrates and fats to shelter the nitrogenous metabolism. The difference between these two dietaries of 1,000 calories could be covered by three pints of milk, or one quart of milk and six eggs. The fats afford the highest calorie content, and, in small bulk, a pat of butter, 100 calories; 2 ounces of cream, 100; a tablespoonful of olive oil, 135, and so on.

It is by such analyses of dietaries that we get the real knowledge of enough and not enough, and the same methods now being applied to infant feeding should be adopted in the study of diet in the adult.

Patients with a moderate fever can take solid food; those with a high fever should be given fluid and semi-solid food until their ability to take solid food is attested by introducing gradually one solid food after the other.

Milk and eggs are the mainstay of this diet. Three quarts of milk a day will furnish between 1,900 and 2,000 calories, and six eggs over 400 more. When it is realized that this milk and these eggs bring with them over 145 grams of proteid, it will be seen that the diet is not well balanced. One pint of milk less would diminish the proteid 17.5 grams, and two less eggs take away 14 grams, thus bringing the proteid down to about 115 grams. The calories to be made up which this pint of milk and two eggs would afford amount to 460. This could be replaced by a helping of oatmeal, 65, with a couple of ounces of cream, 100, and three teaspoonsful of sugar, 100; a cup of coffee with 1½ lumps of sugar, 100; a thin slice of bread, 50, and a half pat of butter, 50.

Or, again, we can take away one quart of milk and so reduce the proteid by 35 grams, leaving 110 grams, and make up the 640 calories by more cereal, cream, sugar, bread and butter.

Among other fluid and semi-solid foods are the following:

	Cal.	Prot., Gr.
Buttermilk, 1 1-2 glasses	100	8.
Kumyss, a glass (7 oz.).....	100	5.
Whey, 2 glasses (13 oz.).....	100	3.50
Milk custard, cup.....	100	6.
Cream rice pudding, very small serving, 2 1-2 ounces	100	2.
Apple tapioca pudding, small serving, 2 3-4 oz.....	100	.25
Boiled rice, ordinary cereal dish, 3 oz.	100	2.5

Oatmeal, bread and rolls have been already given. The foods that have the maximum heat value are the fats and sugars—e. g.:

	Cal.
1 pat of butter, 1-2 oz.....	100
2 oz. cream, 16 per cent	100
3 teaspoonsful, or 1 1-2 lumps sugar.....	100
Oil in dressings, 1-2 oz.....	100

Among the meats, mutton or beef are the best; after these, chicken and turkey. Here is a list of these meats in terms of calories and proteid in ordinary helpings:

	Oz.	Cal.	Prot., Gr.
Roast beef, ordinary serving..	1.8	100	10.
Small steak, sirloin.....	1.4	100	7.5
Leg of lamb or mutton.....	1.8	100	10.
Lamb chop, 1, small	1.	100	6.
Chicken broilers, edible portion, large serving	3.2	100	19.
Turkey, edible portion, small serving	.6	50	3.5
Salmon, small serving.....	1.5	100	7.
Shad, ordinary serving.....	2.1	100	11.
Brook trout, small serving....	1.8	50	10.

Milk may be given hot or cold, with a little coffee, tea, whiskey or brandy, lime water, vichy, or with a pinch of salt if it is more acceptable so. It should be taken slowly.

Eggs can be given raw, or soft cooked, or

*The caloric values are those of standard portions suggested by Dr. Irvin Fisher. J. A. M. A., Vol. 48.

in custard; and, if the yolks distress, the whites may be used. The white constitutes two-thirds the weight of the egg and contains 12½ per cent, or one-eighth proteid; no sugar and no fat. Weight of egg averages 48 grams.

The yolk furnishes one-third the weight and contains about 14 per cent proteid and 33 per cent fat.

Water should be given freely, some one or two quarts a day, and weak tea, coffee and cocoa may be allowed if the appetite is better for it. Too much liquid with the meals sometimes causes flatulency.

When the patient's appetite is poor, and especially if there is dyspepsia, our ingenuity is exercised to the utmost. Tempting dishes and persuasion will do much in the one case; in the other the appreciation that the stomach must be given a proper amount of rest and the kind of food suited to its condition before the quantities desired for the patient can be thrust upon it.

Fat is often responsible for gastric distress and should be excluded for a time. Again, it may be desirable to stop milk for a time and then return to it gradually, or present it in one of its modified forms.

HYDROTHERAPY.

It is hard to steer a safe course between the perfervid encomiums of the enthusiastic and the indifference that often prevails in high places to this line of procedure. The one leads us to believe, by the juggling of his statistics, that profound changes in the mortality of this disease depend on hydriatric measures, while the other makes us suspect that lack of instruction dictates his inertia.

The application of water does effect good in tuberculosis in more ways than one.

First—At fairly frequent intervals every patient should have a cleansing bath in warm water at 100 degrees F. to 105 degrees F., using soap freely.

This keeps the skin free from the irritating effects of the decomposition products of what at times are abundant sweats, and keeps the pores in condition, as well as exerting the refreshing feeling that it requires no exposition of physiological laws for most of us to appreciate.

This warm bath may be followed by a cooler sponge or spray. This may be given twice a week.

Second—For the so-called "hardening" and for the tonic effect.

Cold water is indicated here, but its application must be made with judgment and adapted to the individual case.

It must be remembered that the object is not to withdraw heat from the patient, and the patient must not be submitted to the cold water if he is at the time cold himself. In very weak patients an exposure to warm air or a dry pack in warm blankets should precede application of cold water.

The bath is to be short. The reaction must be prompt. If not, either the technique is faulty or the patient not adapted to the procedure.

For the weaker patients and those reacting poorly it is well to begin by exposing from the dry blanket in which he is rolled, a part at a time, arm, back, chest and abdomen, leg, sponging off with water at 75 degrees F. or 80 degrees F., using a coarse cloth or Turkish towel mitten and rubbing. Rub dry and cover up. This may be begun at higher temperatures, lowering a degree or two each day. Later half the body may be exposed at once and colder water down to 60 degrees F., 50 degrees F. or 40 degrees F. be used.

Patients not confined to the bed can be put in the bath tub at 90 degrees F., and colder and colder water poured over head, shoulders and trunk and, standing, up the legs.

Stronger patients who are about may take the cold plunge, or shower, which can be begun at 80 degrees F. or 85 degrees F., and made each day or two colder. This must be

brief and followed by a brisk rub with a coarse towel.

That this procedure diminishes the disposition to taking cold is universally accepted, and constitutes no mean factor in the prognosis when we appreciate how varied the infection is that constitutes a cold, what its complications or sequelae may prove to be, and how they open the road to a mixed infection.

The tonic effect is striking. The pouring in of stimuli from every point of the body upon the centers and the organs they govern, provided these stimuli are properly regulated as to character and kind, as they are here, is one of the most direct and satisfactory means of influencing the nervous system.

Third—Water may be applied locally to have local effects as to the chest in pain and cough, and will be touched upon later.

(To be Concluded in November Number.)

DYSMENORRHEA.*

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PREFACE.

Normal Menstruation.

Dysmenorrhea.

1. Associated with no pathological lesions..
   - A. Mechanical or obstructive.
   - B. Associated with maldevelopment of the reproductive organs.
   - C. Associated with general ill health.
2. Associated with gross pathological lesions.
   - A. Retroposition.
   - B. Pelvic inflammatory disease.
   - C. Myoma.

DIAGNOSIS.

History.

Physical examination.

TREATMENT. PROPHYLAXIS.

Medical or non-operative.

Operative.

Before going into the subject of dysmenorrhea, let us start out with a fairly good idea of normal menstruation.

We shall not take up the various theories of its physiology, but confine ourselves to a brief consideration of the general principles.

Menstruation may be defined as a phenomenon occurring during the reproductive life in woman, whose most obvious sign is the periodic discharge of blood from the uterus. The time of onset varies with climate, race, social position and mode of life, anywhere from 8 to 16 years. The average in this region is 13 years. The usual interval is twenty-eight days; average duration, three to five days. It is important to remember that every woman is a law unto herself as to interval, duration, amount of flow, pain and systemic upset. As we find considerable variation in different people we must inform ourselves as to the menstrual habit of the patient we are to treat before determining how far from her own normal she is.

In a general way, however, we may say normal menstruation consists in a certain amount of pain in the pelvis, back or thighs, some nervous symptoms such as headache, depression or excitability, and the menstrual flow six or eight ounces in amount.

In a woman of average good health these symptoms should not disqualify her from her usual daily duties. Any very marked increase in these symptoms may be considered pathological, and constitute what is called dysmenorrhea.

The presence of ovarian tissue is obviously necessary to menstruation, probably bringing the phenomenon about by an internal secretion

*Read before the Chattahoochee Valley Medical and Surgical Association, Columbus, Ga., January, 1911.

which, entering the circulating blood, is carried to the uterus, and there brings about the endometrical change resulting in the periodic flow, etc.

The influence of the thyroid on menstruation is now being discussed freely in the literature, and, though we cannot at this time enter into the subject in detail, it is important that we recognize, first, a type of dysmenorrhea associated with scanty flow due to thyroid insufficiency; second, another type wtih menorrhagia due to hyperthyroidism.

We shall see later that certain pathological processes involving the ovaries are responsible for some form of dysmenorrhea.

Numerous classifications of dysmenorrhea have been proposed. The following one by Kelly selected:

1. Dysmenorrhea associated with no demonstrable pathological lesions.

2. Dysmenorrhea associated with gross pathological lesions.

The first group may be subdivided into:

A. Mechanical, which presupposes some obstruction or constriction of the cervical canal impeding the menstrual flow. The main proof of the existence of such a type is the relief experienced after a thorough dilatation of the os.

B. Dysmenorhea associated with maldevelopment of the reproductive organs (an infantile type of pelvis viscera).

C. Dysmenorrhea associated with general ill health, anaemia, chlorosis, etc.

2. Dysmenorrhea associated with gross pathological lesions.

A. Retroposition of the uterus. This is a most common cause, especially in nulliparous women. Almost 90 per cent who have retroposition are sufferers of dysmenorrhea.

B. Pelvic inflammatory disease. About 40 per cent of pelvic inflammatory conditions are associated with painful menstruation.

C. Myoma uteri.

Strange as it may seem, the severity of the symptoms bears no relation to the extent of the lesions. The presence of a few light adhesions binding down a tube or ovary may cause extreme suffering, and a patient with advanced inflammatory involvement may be entirely free from pain. Small myomatous nodules may be responsible for severe dysmenorrhea, and these symptoms may be entirely absent even with large fibroids.

For the practitioner to intelligently and scientifically treat a case under his care it is necessary that he make an accurate diagnosis, first, by a careful history; second, by a thorough examination.

The following points in the history should be made clear. 1. The chief symptom, if it be pain, where is it? When does it come on? How long does it last? Is it relieved by the appearance of the menstrual flow? The pain of mechanical or obstructive dysmenorrhea is said to be colicy in character, coming on shortly before the menstrual flow and relieved on its appearance. That due to retroposition is apt to continue through the period; that associated with pelvic inflammatory disease and myomata comes on before the menstrual period, and lasts to its conclusion.

These points while of some help are by no means reliable or constant. A complete history will, however, bring out other associated symptoms, throwing considerable light on the diagnosis.

In making a thorough physical examination one is handicapped by the fact that a large percentage of the sufferers of dysmenorrhea are young unmarried women. This is one of the few circumstances justifying the obsolete and pernicious practice of treating symptoms without making a complete examination. Even without a vaginal examination one can assure himself as to the patient's general health, nervous system, etc., and it certainly seems better to try first some of the medical measures mentioned below before subjecting a virgin to vaginal examination.

In event of their failure to relieve, the complete examination may be made under an anaesthetic, and preferably per rectum.

As Severinus Pinaeus said over 2,000 years

ago, *"Magnum est crimen perrumpere virginis hymen."*

Treatment: First and foremost, we apply here the principle of preventive medicine, and advise:

Prophylaxis. Every young girl should, if possible, enter her menstrual life in strong and robust health. She should know the nature of the new function and the proper hygiene to be observed during its occurrence. She should be spared any great physical or mental exertion, protected from exposure to wet or cold during the period, and taught the most rigid habits of personal cleanliness. Many young women, with proper preparations and observance of these precautions, could avoid the suffering of dysmenorrhea.

Medical or non-operative treatment:

1. Attention to general health, sleep, rest, exercise, fresh air and regulation of the bowels.

2. Electricity promised much, and in some hands has worked wonders.

3. Pessaries, when properly applied, may correct a displacement though the benefit is often but temporary. Their use has many strong advocates although few men nowadays are experienced in their application.

Drugs:

A. Those which merely relieve pain—anodynes.

B. Those which attempt to reach the real cause.

In the first class may be mentioned the coal tar derivatives—acetphenetidin, phenyl salicylate. Aspirin may be given in doses of two to five grains every four hours, if necessary; counter irritants, externally, heat, mustard, cantharides, either applied to the lower abdomen or spine, extending from the cervical to sacral regions. Cupping, or light touches of the Pacquelin cautery, may prove of benefit. Opiates should be withheld until the last resort. Suppositories containing opium and belladonna, of each grains one, often give relief. Sodium bromide is an old and sometimes efficacious remedy.

Drugs which attempt to reach the real cause of dysmenorrhea are the antispasmodics, as viburnum, cannabis indica, atropine, elixir of celery and guarana, and substances influencing secretions upon which menstruation depends.

The following prescription has proven of value: Sodium or potassium bromide, ounce one; tincturae cannabis indica, drachms two; elixir of celery and guarana, qs. ad ounces, four. Sig. One teaspoonful in hot water every four hours.

When the dysmenorrhea is associated with a scanty flow some drug which could increase the flow might be indicated, the most potent being the glandular extracts. With these preparations I have little experience, and until recently little has been written. Preparations of thyroid, ovary, parotid and mammary glands have all been used with relief, the dose being from one to five grains. When the flow is excessive a substance diminishing these various secretory activities seems to be indicated, sodium bromide and the various calcium salts, for example. In a personal communication, Dr. Howard A. Kelly informed me that Blair Bell, of Liverpool, was using calcium lactate successfully.

Marriage and maternity has cured cases which resisted most conscientious treatment.

Operative Treatment: Naturally, this will depend upon the condition present. If no demonstrable pathological lesions be found, or if the cervical canal be constricted, dilatation and curettage may give relief. This may also prove of value if there be maldevelopment of the pelvic viscera.

Emphasis should be laid on the fact that this operation is a major one, and should be done by one capable of dealing with any possible complications met, under the most rigid aseptic technic. Sometimes excision of a small piece of cervix is necessary. In certain forms Kelly has obtained good results from a wide excision of the infundibulo-pelvic veins including, of course, the accompanying sympathetic nerves.

When retroposition exists it should be corrected. Many operations have been described. At the Johns Hopkins we used a modified Gilliam. I reported the results of a series of our cases in the October number of the American Journal of Obstetrics. The conclusion was that the operation was unsatisfactory in that only 66 per cent were relieved of the symptoms of retroposition. Coffey, of Portland, has gone into the subject from its underlying principles in Surgery, Gynecology and Obstetrics (October, 1908). He thoroughly reviews the field and describes an operation which certainly looks good, and which we are now using. It is a plication of the round and broad ligaments on the anterior surface of the uterus.

If a mild pelvic inflammatory disease is present some conservative operation, with the release of adhesions, may afford relief; in severer cases radical measures may be indicated. In cases associated with fibroids myomectomy or hystero-myomectomy should be done.

Sometimes one meets a case which resists all conservatism, and yet no gross pathological evidence is present.

As a last resort hysterectomy may be done although one is loath to deprive a young woman, particularly if she be nulliparous, of the priceless hope of maternity.

THE WORLD-VIEW OF THE EVOLUTIONIST

(The Journal presents in this issue the first of a series of chapters which will portray to our readers "The World-View of the Evolutionist," for the series will be so entiled. The first chapter sets forth the main features of the universe as a process of evolution under the caption, "The World as it Is, Its Evolution and Its Dissolution." The second chapter will set forth "The Fact and the Factors of Evolution," and so the series will proceed till the whole view point and philosophy of the evolutionist are clearly seen.

We believe that physicians will find the series interesting and, it is hoped, valuable to them.

We invite criticism of this series of articles. Address Evolution, Southern Medical Journal, Suite 905, Van Antwerp Building, Mobile, Ala.)

(Continued from September Number.)

CHAPTER II.

THE FACT AND THE FACTORS OF EVOLUTION.

Its subdivisions are:

1. The Natural Origin of Life.
2. The forms of Life Classified by Resemblances into Families.
3. The Facts from Fossils.
4. The Interdependence of Living Things.
5. The Origin of Species by Survival of the Fittest—Darwin's Discovery.
6. The Continuous Germ-Plasm—Weisman's Discovery.
7. Non-Blendable Inheritances—Mendel's Discovery.
8. The Evidence from Embryology.
9. The Significance of Vestigial Organs.
10. The Birthplace of Man.
11. Origin of Species by Sudden Leaps or Sports.
12. Evolution Theory as Now Held.
13. Evolution Applied to Man.
14. Summary.

This issue of the JOURNAL covers the first three subdivisions, the first being

THE NATURAL ORIGIN OF LIFE.

After the earth's crust had hardened and the gases of hydrogen and oxygen above it had so combined as to form the water that became oceans, rivers, etc., there came a time when the conditions forced certain materials to combine in such a way as to form a living organism, a cell, a microscopic individual, floating in the water and absorbing certain chemical compounds found in the water about it, thus repairing the loss and waste of substance due to its activities, and ever and anon dividing itself so that one cell became two cells. This first of living things (and still the first stage of everything now living, for the egg is but a cell) was composed of six or eight of the eighty or more elements whose atoms compose everything on the earth or in the heavens. These six or eight elements—carbon, hydrogen, oxygen, nitrogen, sulphur,

iron, etc.—are combined in such a way as to make the cell, to make those properties which we call the life-force. These—carbon, oxygen, etc.—are constantly being taken in from the world about the living cell, and, after being used in the making of the life-force, they return to the inorganic world from which they had been taken. Some animals, like the amoeba, are made of only one cell; some plants are made of only one cell, as yeast and bacteria; but most animals and plants are composed of billions of cells, combined in such a way as to form their tissues and organs.

The unit of life, then, is the cell, which is a single mass of living matter with a central portion called a nucleus. Every animal and plant is either one cell or a colony of cells; every tissue of bone and muscle and nerve of the highest animal is composed of cells; the first stage in the life history of the highest animal is a cell (the egg).

The cell is now known to be composed of three chemical compounds—protein, carbohydrates and hydro-carbons—combined to make the marvelous complex called protoplasm. All the properties of the living cell are due to the peculiar way in which these compounds are combined to form this protoplasm, which Huxley called the physical basis of life. The way in which these compounds are combined is so complex that the chemists are unable to give a description of the structure, or even to give a complete formula, of protoplasm. A single molecule of the protein element has six hundred atoms of carbon, nine hundred and sixty atoms of hydrogen, one hundred and fifty-four of nitrogen, one of iron and one hundred and seventy-nine of oxygen. This protein is combined with the starches, sugars and oils to make the protoplasm in which is stored the energy which therein becomes the life-force. "Its great capacity for burning or oxidation serves as a source for vital power. It burns in the living tissue just as coal oxidizes in the boiler of an engine; its atoms fly apart and unite with oxygen so as to satisfy their chemical affinities. If we could only see what happens to the protein molecule when it undergoes oxidation, we would witness a violent explosion like that of a mass of gunpowder." The form of energy thus made becomes the force we call life.

H. E. Crampton, in his Doctrine of Evolution, page 29, says: "We have seen that the essential substance of a cell is a complex chemical compound we call protoplasm, whose elements are identical with chemical substances outside the living world. Is there any ground for supposing that the properties of protoplasm are due to any other causes than those which may be found in the chemical and physical constitution of protoplasm? In brief, is life physics and chemistry? Nowadays the majority of biologists believe that it is so. The marvelous properties of protoplasm are regarded as the inevitable derivatives of the combined properties of the various chemical elements which constitute protoplasm. Scores of students of physiological chemistry have duplicated the chemical processes of living matter, which were regarded as so peculiar to the living organism that they seemed to be due to the operation of a non-mechanical and vital cause. The biologist finds himself unable to regard protoplasmic activity as anything different in kind or category from the processes of physics and chemistry which go on in the world of dead things."

We may therefore assume that life was a natural result—a function of the relations set up by the physical and chemical union of the matter contained in the protoplasmic cell. It is, says Herbert Spencer, "a continuous adjustment of internal to external conditions"—a continuous intake of new non-living matter; a continuous outgo of motion; a continuous interaction between itself and its environment. Life ceases the moment this continuous adjustment is destroyed. It is the force generated by the structure and material of the cell; it is a function of this structure and material.

just as wetness is a function of the union of hydrogen and oxygen, just as saltiness is of the union of sodium and chlorine.

It is confessedly still nature's secret—this making of life. No laboratory has made it, and the ultimate cause, bringing certain lifeless bodies together so as to produce living matter as a result, is still a profound mystery. It is thought that the liberation of energy seen in every form of life is electrical, and possibly due to chemical unions forced by electrical conditions; but whatever the cause, whatever the method, nature is ceaselessly at work at it, changing the non-living matter, the inorganic, into the living, the organic forms.

This chapter will be an effort to state the method of nature as it evolved from one protoplasmic cell the first form of life, which floated, fed and reproduced itself in the ocean, into the highly complex and beautiful forms that are now seen as fossils in the rock and as plants and animals teeming the ocean and covering the plains and mountains with living beings, plants and moving animals. This process is called evolution—a word first used in this sense by Herbert Spencer.

THE FORMS OF LIFE CLASSIFIED BY RESEMBLANCES INTO FAMILIES.

As we look about us we see that living things have myriad forms, each reproducing its own kind. We see that some forms are adapted to land, others to the air, others to the sea. Some of these forms have few similarities, as the elephant and the insect; others have many similarities, as the cat and the lion. These similarities lead us to classify the plants and animals. Confining our attention to the animals, we find all species of man, apes and monkeys are classed together by all naturalists and called primates; cats, leopards, tigers and lions form another group by reason of their manifest similarities; bears and raccoons are in another; seals and walruses are in another; while the last four groups mentioned are put all together in a class called carnivora because they are flesh eaters. Rats, rabbits and squirrels gnaw their food and are classed as rodents. Horses, hogs, elephants, camels, etc., are similar in having hoofs, and so are in the same class the ungulates. Those that fly in the air and have feathers are birds. Those that live in the water (except the whale, porpoise, dolphin and a few others) are fishes. Yet, dissimilar as all these classes of animal forms are, the primates, the carnivora, rodents, ungulates, birds and fishes are similar in having a backbone, and so all are classed together as vertebrates. Below the vertebrates we find hundreds of thousands of species of animals with so many similarities that we call them all insects. Below these we find forms we class as crabs and crustacea. Below these in descending scale are the worms, the polyps, the hydras, and, lowest of all, the one-celled animals like the amoeba, which is but a mass of protoplasm enclosing a nucleus; it has no covering or skin, and is about one one-hundredth of an inch in diameter.

The kinship of all the varieties of the insects is set forth by Crampton as follows (*op. cita*): "Butterflies, beetles, bees and grasshoppers seem at first sight to be entirely different, even though they agree in being more or less segmented. But all of them have heads with four pairs of appendages of the same essential plan, middle thoracic regions of three segments more or less united, bearing three pairs of legs and usually two pairs of wings, while the hinder part is a freely jointed abdomen without real limbs. In these respects the countless varieties of insects agree so that they also, like crustacea of various kinds, seem to have been derived from worm-like animals with more simply segmented bodies. Indeed, spiders and scorpions and their relatives of the group arachnida prove for similar reasons to be derivatives from the same original stock and own cousins of the insects."

The plants are not less alive than the animals, though they are not apparently awake

and aware of their own individuality. They are sensitive in every cell just as an animal is, though not sensible of their own existence as the higher animals are during their waking hours. The condition of a higher animal asleep simulates that of the plant—a living, sensitive individual, without awareness of itself or its surroundings. Awareness seems to come into being as the work of the nervous system with its brain that thinks. Apart from brain action, there is only sensitiveness—a quality which the plant has. Nor are the plants less interesting than the animals in the forms which they assume, for we can find relationship among those forms just as we traced it in the animal world in some paragraphs above. Here, too, we find that those which resembled each other most are nearest akin.

The plant world differs from the animal world in that the plant cell alone has the power to convert lifeless matter into living matter—to manufacture protoplasm from the mineral world, from the water, salts, gases, etc., absorbed by its roots and leaves. The plant does this by its as yet unexplained power of making a green coloring matter, called chlorophyll, which can absorb certain rays of the sun and can break up the water and carbonic acid in its leaves into hydrogen, oxygen and carbon, and then set free the oxygen, but retain the carbon and hydrogen, locked together as hydrocarbon. Thus the plant stores up the energy for its own use and that of the animal which does not have the power to do this, but must feed upon that made by the plant.

We observe that all the plants may be assigned to one of two classes—the seed plants, having flowers, and the spore plants, having no flowers. The seed plants, with their wealth of beautiful leaves and flowers, make the familiar objects of woods and fields, but the spore plants, many of which are microscopic, are more numerous than they. These spore plants include the bacteria, the algae, the molds, the yeasts, the fungi, the lichens and the ferns. The algae, of which there are twelve thousand or more varieties, some less than one-millionth of an inch in size, others being the giant seaweed, have the power to make chlorophyll and are probably the oldest of the plants. Probably descended from these are the ferns, which well-nigh covered the earth during the early time known as the Carboniferous Age, and produced the vegetable matter that formed the coal beds whose contents are now made to furnish us the heat and power then locked up.

We observe further that all the seed plants may be again assigned to one of two classes—those which are naked-seeded and those which are cover-seeded. The naked-seeded are close akin to the ferns, and, if evolution be true, descended from them. They include the pines, firs, larches, cedars and cypresses. The cover-seeded are no doubt descended from these if evolution be the true process of creation. There are two classes of the cover-seeded plants—those with the single seed-leaf, that include the large families known as the lily and the grass, the latter including maize, wheat, barley, oats, rice and other foods of man; those with the double seed-leaf, that include all the highest varieties, the birch and the alder, the poplar and the oak, the daisy family and the rose family, the latter yielding not only the queen of flowers, but including the most valuable varieties of fruits from the strawberry to the apple.

This completes a general survey of all the plant world. We observe that all the seed plants have a similar way of perpetuating their species by organs known as flowers, some of which are highly colored, while others are not. We find that all those plants which have highly colored flowers depend on insects for their fertilization, while those without highly colored flowers depend for fertilization on the wind or on the water. In one common variety of aquatic plants the male flower, on maturing, rises to the surface of the water.

where it floats and comes in contact with the female flower, which, on receiving the pollen, sinks to the bottom, where the seeds ripen. The flowers are now among the chief ornaments of the earth, but it seems probable that the earliest flowers were colorless, the color developing as a correllation to the insect world, whose eyes would be surer to find the plant with its flowers most highly colored. It will be of value to us to review a classification that includes all the plants and animals of the world.

There are four divisions of the plant world.

First—The plants without reproductive organs, but that multiply by division of one into two, or by "spores." These include bacteria, yeast, plants, molds, mushrooms, lichens and seaweeds.

Second—Moss plants. These are green and have reproductive organs, but no roots and stems and veins.

Third—The fern plants. These have roots, stems and leaves, but no flowers and seeds.

Fourth—The seed plants. These have seeds and flowers, and they embrace most of the vegetation of the earth, its herbs and shrubs and trees.

There are over one hundred thousand kinds of seed plants described by the botanists, who divide them into two groups—those with naked seeds, immensely abundant in earlier geologic ages, but now having only four hundred species; and those whose seeds are in closed capsules and now predominating in the plant kingdom.

There are eight divisions in the animal world. First—Protozoa. These are one-celled animals and are usually of microscopic size. They have no organs and reproduce by self-division. They include the amoeba, the paramecium, globigerina and many other forms. Second—The Coelenterata. These are composed of many cells and include the sponges, corals, jelly fishes, anemones and medusae. Third—The Echinodermata. These have a tough skin and have parts radiating from a center, usually five in number, and have a mouth, alimentary canal and digestive system. They include the starfish, crinoida and sea urchins. The extinct fossil species of this branch outnumber many times the living species. Fourth—Worms. These include the flukes, tapeworms, pinworms, trichinae, earthworms and seaworms. They have no special sense, except that of touch, and they have no internal skeleton. Fifth—Molluscoidea. These have no heart or circulating system, and they multiply by budding. There are four thousand species of them, but ninety-five per cent of them are extinct—are found only in the fossil state. Sixth—Mollusca. These include mussels, clams, oysters, snails, cuttlefishes, squids and all one-valved shell fish. These have the special senses of touch, smell and hearing, while some have eyes. Seventh—Arthropoda. These include crabs, crawfish, shrimps, barnacles, lobsters, spiders, insects, and centipedes. Their bodies consist of rings covered with a hardened cuticle, an exoskeleton. There are more species of arthropoda than of any other branch of the animal kingdom. All the insects are six-legged arthropoda, and there are, according to estimates that seem to be conservative, over five million species of insects. The insects include flies, ants, bugs, bees, butterflies, moths, fleas, lice and grasshoppers. Eighth—Vertebrate. These include all animals with a backbone. The lowest of these are the fishes. Then come the amphibia, adapted to life in both water and air, as salamanders, frogs and the coecilia. Just above the amphibia, and evolved out of them, come the reptiles, which include the turtles, alligators, lizards and snakes. Just above the reptiles and manifestly descended from them come the birds. We have abundant fossil remains of the archaeopteryx, a reptile-bird. There are now ten thousand species of living birds. Above the birds are the mammals, the animals that suckle their young and have a covering of hair. There are six thousand species of mammals, about

two thousand five hundred living and three thousand five hundred extinct or fossil. The mammals are divided into twelve orders that include all species from the lowest, the egg-laying duckbill and echidna, to the highest, the primates, that include monkeys, apes and man.

This survey includes all plants and animals. It is interesting to note in passing that the scientists regard the daisy as the most highly organized plant, ants and bees as the most highly organized insects, the jay as the most highly organized bird, and man as the most highly organized mammal. These plants and animals occupy various areas. Some, like man, the cat family and various birds, have distributed themselves widely from the place of their origin to most parts of the earth, but others are still in the limted range where they developed. Many species of animals and plants in Australia, the kangaroo, wombats, duckbills, echidnas, etc., for instance, are found nowhere else on the globe. The Azores and the Sandwish Islands were without frogs, snakes and mammals, except the bat, for the reason that only flying animals could cross the expanse of water surrounding them. For a like reason Ireland has no snakes, while England has the viper and a few other varieties of snakes. Ireland was separated from England long ages before England was separated from the continent and before snakes had migrated there. This fact—the earlier separation of Ireland from England by a wide expanse of water before England was so separated from the continent—explains the interesting circumstance that only twenty species of mammals are native to Ireland, while there are forty species native to England and ninety species to Germany. Thus it seems clear that plants and animals often migrated from the localities in which they had developed from simpler forms into higher forms—forms which differed under the different conditions found in different areas—and that this migration would be limited by such natural barriers as high mountains or wide waters.

The fact of evolution seems to be made manifest when we have made a survey of all living forms of both animals and plants and find that they may be arranged in the order of complexity—from simple to ever more complex by small gradations. When we further find, as we do, that only the simplest forms are found in the oldest geologic strata, that the most complex forms are found only in the most recent strata, and that there is a gradation of complexity in fossil forms from the oldest to the most recently laid strata, each strata having types only a little less complex than those just above it and very similar to them, the evidence of the creation of animals and plants by a process of evolution seems complete.

THE FACTS FROM FOSSILS.

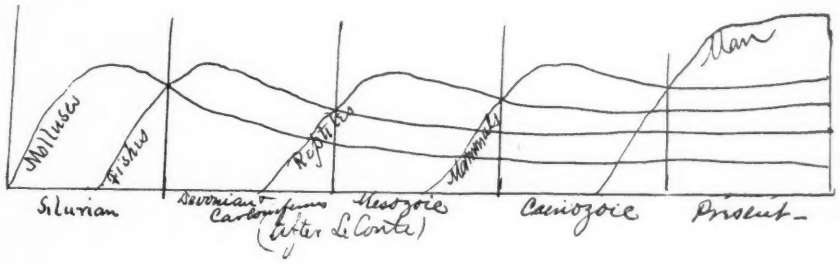
The stratified rocks in which fossil remains of ancient forms of life are found are classified according to the era in which they were formed, as follows:

1. The Palaeozoic, the most ancient rocks that contain forms of life. Trilobites and crustaceans and molluscs are found in the lower rocks of this era; the simplest fishes and amphibia are found in its upper strata. The molluscs (shell fish) were for a long while of great size, number and variety—very far greater than they now are. They were then the highest form of life and the rulers of the seas for long ages. When fishes came into being and increased rapidly in size and number and variety, because of their higher powers they overcame the molluscs, and so they became the rulers of the sea.

2. The Mesozoic or Middle Age. Many of the forms of the Paleozoic became extinct, as the trilobites, and many are found to persist in the Mesozoic and the present age; but the Mesozoic reptiles came into being and predominate. The reptiles grew into many varieties of form, some of them to huge

them. There were swimming reptiles that ruled the sea, walking reptiles that ruled the land, flying reptiles that ruled the air.

3. The Caenozoic or Recent Era. This age reaches to the present time and because the mammals which had come into being in the previous age became predominant, it is called the Age of Mammals. The mammals, at first small and of the type known as marsupials (bearing their young in pouches), had begun their existence in the Mesozoic, but in the Caenozoic they developed very rapidly, increasing in number and variety and powers until they took the mastery of the earth. The reptiles persisted as did the fishes and the molluscs, but in diminishing numbers and in subordinate position. Finally man came into being—a mammal with superior intelligence because of his larger and better brain, destroying those animals dangerous to him and preserving those useful to him, and so acquiring the mastery of the earth.



Through these ages we can now plainly see proportions, the sea and land swarming with the fact that the forms of life which began as a simple cell in the earliest Paleozoic became more complex and various from age to age; that forms of life underwent a "continuous, progressive change according to certain laws by means of resident forces" (LeConte), for not only do we find in the oldest lowest rocks the simplest, least organized forms, but in tracing the forms from stratum to stratum we find "successively forms more and more complex in structure, in the interaction of correllated parts and in the interaction with the environment, until we reach the highest structure only in the present time." This makes plain the fact that the present forms of life are what they are because of their being the last of a long series of changes—of a process of evolution. The continuous, progressive changes from the age in which molluscs were the highest form of life to the present time is seen in rough outline in the accompanying diagrams:

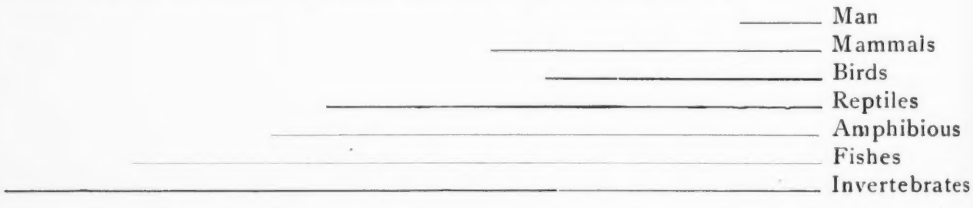
It is conceded that the evolution of the multifarious forms of life has required many millions of years. It is impossible to determine the age of the earth—to find the time when, from dispersed matter, the law of gravitation orbed our planet and sent it spinning around the sun in days and years—but the geologists are agreed that an approximate estimate can be made of the number of millions of years that have elapsed since the first stratum of sediment was laid on the plutonic rocks in the bottom of the ocean. As one atom of oxygen and two atoms of hydrogen will invariably rush into combination and become the steam of water when they, as gases, are subjected to a temperature of 5,000 degrees Fahrenheit, it must have happened when our earth had so lowered its temperature that a crust had formed and the hydrogen and oxygen gases of its atmosphere had been converted into the steam of water, that a still further cooling of this crust would cause the condensation of the steam into water, with which the entire surface of the earth would be cov-

Strata and number of feet deposited---animals dominating

Caenozoic Age	Quarternary ..... 4,000 feet	Mammals
	Pliocene ..... 5,000 feet	
	Miocene ..... 9,000 feet	
	Oligocene .....12,000 feet	
Mesozoic Age	Cretaceous .....14,000 feet	Reptiles
	Jurassic ..... 8,000 feet	
	Triassic .....13,000 feet	
Palaeozoic Age	Bermian .....12,000 feet	Amphibians
	Carboniferous .....24,000 feet	Fishes
	Devonian .....22,000 feet	Molluscs
	Silurian .....15,000 feet	Crustaceans
	Ordovician .....17,000 feet	
	Cambrian .....16,000 feet	

A diagram showing what the total thickness of the fossil-bearing earth's crust would be if all the surface deposits since the time of the first appearance of life had accumulated on top of each other. (After Osborn.)

The lines below indicate how long the various classes of animals have been on the earth. The lower end of the line reaches to the strata where the fossils of a class are first found.



ered until, by the elevation of some of the land areas, continents and ocean basins would be formed. Thus the Oceanic Era would be followed by the formation of continents of land whose surface would be eroded by the action of water, which, as rivers, would carry the eroded material to the sea, where it would sink to the bottom and form the stratified rocks. The geologists are agreed that since the oldest strata on the earth were thus laid there have elapsed approximately one hundred million years. The period of time has been sufficiently long to make sedimentary deposits into strata which, if all of them were laid one above the other at the same place, would make a height of fifty miles above that first laid. The time necessary to accumulate this enormous thickness of sediment on the crust; the time necessary to wear away certain known elevated surfaces of land by the action of water and wind and frost; the time necessary to derive the salt and other contents of the ocean from the land by the washings of the rivers (for the ocean was at first pure water)—these, with certain other data known to the chemist and physicist, make the basis for the estimate, which must be fairly accurate, for the different methods of computing reach approximately the same result. In the same way as that by which the scientists estimate the number of years since the oldest strata of rocks were laid, they determine the

number of years since those strata containing the earliest fossil forms of life were laid. The last era, the Age of Mammals, is estimated to be four millions of years, and as the geologists reckon this age to be approximately one-twentieth of the whole time since the most ancient rocks containing fossils were laid, we may safely say in answer to the question, "How long since life appeared on the earth?" not less than eighty million years.

Osborn, in his recent work, "The Age of Mammals," says:

"Whatever method of calculation we adopt, the Age of Mammals, while vastly long in itself, is relatively short as compared with all the life periods which preceded it. Each of these ages represents a vast interval, as attested both by the great geographic changes which occurred in them, by the great mountain chains which were thrown up and then reduced to the general level, by the enormous thickness of the sedimentary deposits which were laid down on land and sea, recently estimated at 335,800 feet, and still more, perhaps, by the great changes in animal and plant life which are recorded in the fossils."

He quotes with approval the estimates of Wallace and others that the Age of Mammals has been in progress four million years, and that it is one-twentieth the whole time since the earliest fossil-bearing rocks appeared, and that the Alps and Himalaya Mountains were born since the Age of Mammals began.

"The Eocene (dawn of recent) epoch is characterized by the first appearance of man and of the ancestors of the modernized mammals and the gradual disappearance of many of the archaic types characteristic of the Age of Reptiles."

"How long was the Age of Mammals? How many years ago did it begin? If we remark, for example, that Echippus, the first stage in the development of the horse, was an animal which lived about three million years ago, our hearer looks incredulous, but he should realize that at that time the mountain systems of the Pyrenees, the Alps and the Himalayas were still unborn—level surfaces, in fact, partly washed by the sea. In North America, since the close of the Eocene, the region of the present Grand Canyon of the Colorado has been elevated 11,000 feet, and the river has carved its mighty canyon through the rock to its present maximum depth of 6,500 feet."

(To Be Continued)

STRUCTURE AND FUNCTIONS OF THE BODY.

A handbook of Anatomy and Physiology for nurses and others desiring a practical knowledge of the subject. By Annette Fiske, A.M., Graduate of the Walthan Training School for Nurses. 12mo. of 221 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1911. Cloth, $1.25 net.

The author has conceived of the plan of teaching the structure and functions of the body to nurses and others desiring a general and practical knowledge of this subject, by presenting along with each portion of the anatomy, the physiology, and in some instances, the hygiene of the part under consideration. This, no doubt, might be of advantage to one desiring just a general knowledge, as the plan is logical and practical. It is a very easily mastered text for the advanced pupils in the public schools, and every pupil graduated from such schools should know something of the above subject.

This book begins with a study of the general structure and composition of the body, taking up the discussion of a cell and its development, and then describes the processes by which it gradually becomes differentiated into the various complex tissues of the body. The special tissue, such as bones, blood, muscle, glands, nerves, etc. Skin and its appendages are discussed first from a structural standpoint, and then with reference to the specialized function of each.

Then the plan is to present each region separately. First, the cranium and face are described from an anatomical point of view, gradually working up to the subject of special organs, and the functions of each. Then the nervous system, back and chest, abdomen, and upper and lower extremities, are taken up, and along with each, there is presented the general anatomy and the physiology, together with some of the diseased conditions, pertaining to the structures, special organs, or divisions of each region.

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Next Meeting Hattiesburg, Miss., November 11-13, 1911.

The Hattiesburg Meeting of the Southern Medical Association

The coming meeting of the Southern Medical Association at Hattiesburg promises to be the most successful in the history of that organization.

President Dyer has been untiring in his efforts to increase membership in the association and to make the meeting of great interest; the section officers are working as never before to have their programmes most attractive; Dr. D. W. Jones, Councillor for Mississippi, promises that his State will have the largest attendance of any State in which meetings have been held; and Dr. W. W. Crawford informs us that Hattiesburg will provide the best entertainment features that have yet been given the association. With all these forces at work, there can be no doubt of the success of the meeting.

There seems to have been some apprehension on the part of a few that Hattiesburg is too small a city to provide comfortable hotel accommodations for the number of physicians who attend the meetings of the Southern Medical Association. This comes from the fact that the association heretofore has met in larger cities—i. e., Birmingham, Atlanta, New Orleans and Nashville—and the wonderful growth of the city of Hattiesburg and the enthusiasm of the progressive citizens may not be known to all busy doctors. The editor has had the privilege of visiting Hattiesburg, and he can assure the members of the Southern Medical Association that they can all go to Hattiesburg with the certainty of being comfortable in every way. The Hotel Hattiesburg is the largest and finest hotel in Mississippi, and, if necessary, the citizens of Hattiesburg have promised to open up their homes to the visiting physicians.

We believe that the coming meeting will be the best that the Southern Medical Association has ever had, and we urge every doctor

who is eligible to membership to arrange plans now to attend the Hattiesburg meeting in November.

Any physician residing in the States of Georgia, Florida, Alabama, Mississippi, Louisiana and Tennessee, who is a member of his County Medical Society, upon application becomes a member of the Southern Medical Association. Each member receives, without extra cost, the SOUTHERN MEDICAL JOURNAL, which is also the journal of the Southern Medical Association. Many physicians say that the JOURNAL is worth more than the three dollars dues. Subscribers to the JOURNAL who are eligible to membership in the association may become members by adding one dollar to the subscription price of the JOURNAL.

Tulane's School of Tropical Medicine and Hygiene

THE JOURNAL has received a pamphlet from the Medical Department of the Tulane University of Louisiana, in which is given the details of a scheme for establishing a *"School of Tropical Medicine and Hygiene,"* in New Orleans, as a department of Tulane University. Preventive Medicine will also be given a prominent position in the scheme. The laboratories of this school were opened and work begun on September 29. Although careful teaching concerning such tropcal diseases as may be met with in this country, as well as instruction in hygiene and preventive medicine, is already provided in most of the standard schools of medicine, especially in the Southern States, yet nowhere in this country is there a school devoted entirely to these matters; but they are of such great and growing importance that such a school is called for, and nowhere else, in our opinion, are all the conditions so favorable for its establishment and successful operation as at Tulane.

It ought not in the least degree to interfere with the work of any other college of medicine. Each will continue to maintain its teaching of tropical medicine, perhaps to the extent of devoting an entire chair to the subject, yet when a student desires to become a specialist or teacher therein, a course, whether post or pre-graduate, at the proposed school would be of immense advantage.

In opening the School of Tropical Medicine, Dr. Isadore Dyer, Dean of the Medical Department of Tulane, showed his usual wisdom and good judgment in selecting, as the head of that school, Dr. Creighton Wellman, who is recognized as one of our best authorities on medical zoology and tropical diseases. Dr. Wellman is a native of Missouri, and has had a broad education and wide experience in scientific medicine, including work in London and Berlin for several years. He is a member of a number of scientific societies, chiefly European. He is a member of the Permanent Committee for the International Entomological Congress, and is American Secretary for the London Society of Tropical Medicine and Hygiene. Dr. Wellman has written many scientific papers on medical and natural history reasearch in English, Latin, German, French and Portuguese. With all his scientific attainments he is most practical, and we predict that Tulane's Tropical Medicine School, under his direction, will be a great success.

The importance of adequately instructing Southern medical students in the recognition, course and treatment of tropical diseases has been recognized by several well known Southern medical schools, which are fortunately located in important ports, having direct steamship connections with tropical countries. The subject has been given special attention by the Medical Department of Tulane University of Louisiana, at New Orleans; University of Alabama, at Mobile; South Carolina, at Charleston; Johns Hopkins, at Baltimore; Texas, at Galveston, and Pennsylvania, at Philadelphia.

Their students are made familiar with the sources of plague, yellow fever, cholera and typhus, are carefully taught the principles and

application of public and private prevention, the ways in which may best be destroyed the insect and animal carriers of infection, and the danger that lurks in an unsuspecting human host who is personally immune or has recovered, but whose system harbors the germs.

They are instructed in all the knowledge pertaining to the diagnosis and treatment thereof, and if nothing better were available present conditions would serve a good purpose, being far in advance of what prevailed ten years ago.

But more is needed, and Tulane is the logical point for a separate department or school to be established, one provided with buildings, apparatus, laboratories and museums, and funds to equip and send to endemic centers of tropical diseases scientific expeditions for their observation and study.

This is a matter that should interest not only physicians, but also men of business, and the larger their operations the greater their interest.

It is such work as above suggested that has banished from our cities yellow fever and cholera, with their senseless panics costing millions of dollars.

Today a worse invader, more insidious and more difficult to eradicate, threatens every Southern and every Pacific port. Any night a rat, infected with plague, may crawl ashore over some ship's hawser, and when, weeks later, the disease is discovered, millions of dollars in trade and travel will be lost, and other millions spent in frantic efforts to get rid of the fearful disease. Wealthy men can find few finer opportunities for the profitable investment of surplus bonds than in endowing such a school of Tropical Medicine at Tulane, or at any other Southern University. Its graduates would constitute an army of sentinels whose skillful work would go far to protect the country against the epidemics that constantly threaten our communities with panic, loss, disease and death.

What better monument can any man rear to his own memory and the honor of his descendants than a School of Tropical Medicine bearing his name?

There it would stand, a bulwark against misfortune to his countrymen, long after busts of bronze are broken and marble tablets crumble into dust.

The Ross "Thick Film" Method in the Diagnosis of Malaria

We wish to call the attention of the profession to the above named article appearing in this issue, written by Dr. W. M. James, Ancon Hospital, Ancon, Canal Zone.

Every physician who makes blood examinations for malaria knows the immense amount of time consumed in the examination, and the uncertainty of the final results. Too often the time eleemnt prevents the physician from attempting an examination.

Dr. James has written a most valuable and instructive paper on the new method, introduced by Ronald Ross in 1903, by which time may be saved, and more accurate results secured. It is indeed a boon to the laboratory examination for malaria. Not only are the positive findings greatly increased in real value, but likewise more importance can be attached to the negative findings.

The average number of cases in the Ancon Hospital diagnosed as malaria, by finding the parasites in the blood according to the usual thin film method, from January, 1905, to September, 1910, was 58 per cent, which leaves a too large per cent to be diagnosed by the symptoms alone. To test the real value of the Ross method, Dr. James followed up one hundred cases, examined in the usual way by other physicians in the Ancon Hospital, and whereas the former method resulted in positive findings in only 60 per cent of the cases he found the parasites in 94 per cent of the same cases.

Another great advantage, as pointed out

by the writer, is that this method is successful even in those cases which have had quinine before being admitted to the hospital. He states that the parasites can be found on an average of three days after administering quinine. By the old method it is exceedingly difficult to find them under these conditions.

The technique is described very carefully and comprehensively in the article, and certainly every physician can afford to spend five minutes, the time allotted to each examination by Dr. James, to the examination of every suspected case of malarial infection.

We wish to express our appreciation to Dr. James, not only for this excellent paper, but for the work he is doing in the Canal Zone along the line of progressive medicine.

Nashville's One Great Medical School

Mr. W. K. Vanderbilt has recently donated to the general endowment fund of Vanderbilt University one hundred and fifty thousand dollars, and the Education Board of New York another one hundred and fifty thousand dollars, provided the University secures the Peabody campus in South Nashville as a home for its Medical Department. This provision has been met, and the Medical Department will now be situated on this beautiful site. This campus is located in the highest part of South Nashville, is within one hundred and fifty yards of the City Hospital, and consists of sixteen acres of ground, on which are eight buildings, some of which are considered the most beautiful in the State from an architectural standpoint. A hundred bed charity hospital will be opened, which insures ample bedside and clinical instruction.

The Medical Department of the University of Nashville and Tennessee has closed its doors in Nashville and moved to Memphis. The following gentlemen from the University of Nashville and Tennessee have been taken into Vanderbilt faculty: Drs. Hilliard Wood, R. O. Tucker, W. D. Haggard, Robert Caldwell, Perry Bromberg, W. E. Hibbett, C. E. Brush, H. M. Tigert and W. A. Oughterson. The old faculty retain their places, and many of the young men who are graduates of the department have been promoted. Dr. Witt, who has had the chair of Materia Medica and Therapeutics for many years, will now share the chair of Medicine with Dr. J. A. Witherspoon. Dr. Witt is succeeded by Dr. McPheeters Glasgow, of Nashville.

The Texas State Board of Health

The above-named organization is certainly what is termed, in modern slang, "a live wire." In the June number of this JOURNAL considerable space was devoted to consideration of its Bulletin for January, wherein its "special medical inspector, Dr. Fred J. Mayer," reported the results of his observations during an official trip through "European countries, the West Indies and Venezuelan and Columbian ports." If any of our subscribers failed to read the brief analysis of his report (pages 447-448), we advise them to retrieve their loss by reading it now. Since January the board has issued Bulletins for succeeding months, those for February and March now lying on the editor's desk. Several subjects are therein treated with prominence, logic and force.

Most of the March number is devoted to a conclusion of the report by Dr. Mayer, the subject being bubonic plague.

His information is recent, accurate and fresh from the most reliable sources. He considers the disease the most menacing peril that now threatens maritime cities of the Gulf and Pacific coasts. Pages could be written in support of his belief, but the following undeniable fact is enough by itself to warrant alarm—namely: Plague has established itself in the rodents of England.

English officials declare that *"the time has come for active measures,"* and that *"national effort"* is needed.

"There is a possibility of a very serious and

general diffusion of the outbreak in England." This is the warning spoken by Sir James Crichton-Browne before the Royal Institute of Public Health, a man of eminence and good sense.

Not only are we threatened with infection from English ports, but also from California, China, India and some of the ports of South America.

Dr. Mayer does not recommend quarantining against London or other infected ports, but he believes in the plan of exterminating the rats on every ship from an infected port. For this purpose, unfortunately, an expensive sulphur engine is required. Also the fumes are corrosive to metals. Something better will have to be provided, something like carbon monoxide, for instance.

Next, he believes in anchoring vessels at a distance from wharves and making the sides of the wharves impossible to climb, which is an easy matter. When ships tie up they must not touch the wharf, but be held several feet away, while the rope that holds them must carry, near the ship, a funnel-shaped affair of metal with a big, open mouth, its large end into the funnel, but cannot climb over it. Two toward the ship. A rat going ashore crawls such funnels on a hawser, three feet apart, their large, open ends facing each other, form a deadly trap. Rats climb up the slope, drop to the hawser, and then cannot go either way.

This JOURNAL has sounded the plague alarm several times. The day will come, we fear, when all our powers will be required to eradicate that which we might prevent, *if it be not already too late.* It is none *too soon to* be on the lookout for the appearance of dead rats, which are often the first intimation of plague infection. And it is not too soon to go to *killing* them by every known means. In each of such cities as New Orleans, Mobile, Charleston or Galveston there are more than *one million* rats. One infected rat in each port can infect them all. Not a week passes in either port, and in some not a day, without the arrival of a vessel from some infected port.

Do you think the alarm sounded by the Texas State Board of Heath is sensational? How many millions of dollars can now be saved in any maritime city by the proper expenditure of a few thousand for prevention!

Southern Physicians in Europe

Perhaps no section of our country has a larger proportion of physicians and surgeons to visit the European medical centers every year than the South. They do not always go for instruction, because many of them have attainments equal to the greatest of any country, but they go to see what is being done by others, and, if they find advances in any line, Southern physicians and surgeons are quick to adopt them.

Among the number of physicians from the South to spend the summer in Europe is Dr. Rudolph Matas, of New Orleans, whom we consider the peer of any living surgeon. Before returning in the early part of October, Dr. Matas will attend the Congress of the Societe Internationale de Chirurgie, which meets in Brussels September 26-30. Dr. J. T. Halsey is another New Orleans physician who is enjoying a holiday abroad and at the same time is working in some of the European hospitals.

Dr. E. D. Bondurant and Dr. H. P. Cole, of Mobile, who have been in England and Scotland for several months, have extended their journey into the continent. They will return in November. Dr. Bondurant will spend some time in the neurological clinics of Berne and Vienna, while Dr. Cole is in Italy with the Commission of the London School of Tropical Medicine for the Study of Pellagra, of which Dr. Cole is an honored member. Sambon, who maintains that the gnat, simulium reptans, transmits pellagra, is also a member of this commission. Dr. Cole was one of two Americans invited to read papers

before the British Medical Association at its recent meeting in Birmingham, England. His subject was "A Review of Thirty-One Transfusions in Pellagra."

Dr. Charles A. Thigpen, of Montgomery, is another eminent Southerner who is renewing his acquaintance with the European physicians interested in his line of work.

The Southern Medical Association

NEW ORLEANS, LA., Sept. 15, 1911.

To the Members of the Medical Profession of the South:

The Southern Medical Association needs all of the profession in the South on its roll of membership, and it would be gratifying to the administration of the present year if those who may be interested and who are not already members would join before the Hattiesburg meeting, November 14, 15 and 16.

The purposes of the association are wholly those which govern us, and the opportunity of gathering annually in our own section to further our own interests should appeal to all. Each of the meetings has been successful, enjoyable and enlightening, and the coming meeting promises more. All of the sections are busy preparing their programmes, and the profession in Hattiesburg is ready to welcome their confreres with open arms.

Our genial and industrious Secretary, Dr. Harris, is anxious to enroll a large increase in membership, and to him you may send application.

There are many matters of mutual interest which will come up this year, and the spirit of these meetings is full of a growing concern for the future of our public health in the South as well as the preservation of our traditions.

Will each of you who may read this letter plan to come to Hattiesburg in November and join the movement for a common good?

Yours fraternally and faithfully,

ISADORE DYER, *President*

CORRESPONDENCE

HATTIESBURG HOTELS

AND RAIL..AY CONNECTIONS TO THE NOVEMBER MEETING OF THE SOUTHERN MEDICAL ASSOCIATION.

Editor JOURNAL.

The Entertainment Committee of the Hattiesburg Commercial Club is now considering plans for the entertainment of the Southern Medical Association, which meets in this city November 14-16, and will co-operate with the local membership to attract the largest attendance of the medical profession that has yet marked the meetings of that association.

There has been a little apprehension on the part of some of the members concerning the ability of Hattiesburg to take care of such a meeting, due, perhaps, to a lack of information about the availability and capacity of the city, but a study of the map and a knowledge of Hattiesburg will promptly quiet all such apprehensions.

It is an admitted fact that one of the requirements of a convention city is railway connections, and in this respect Hattiesburg meets all the requirements, both as to the number of roads and train schedules, which make it possible to get in and out of the city at the most advantageous time from every direction. Located on the main line of the Queen & Crescent system, with its Alabama and Louisiana connections and four trains each way daily, transportation facilities are provided from a large territory. The Gulf & Ship Island connects at Jackson with the Illinois Central main line through trains, and its Mississippi connections acord easy means of reaching Hattiesburg, and it should be

kept in mind that the Gulf & Ship Island is not an ordinary branch road, for, while it is a short system, it makes fast running time, has first-class equipment and reaches Hattiesburg morning and evening, so that members of the association can reach the convention city without great loss of time. In addition to these connections reaching a major portion of the association territory, Hattiesburg has connections at Mobile with the New Orleans, Mobile & Chicago Railway, at Gulfport with the Gulf & Ship Island, at New Orleans the splendid train service of the N. O. & N. E. Ry. and the Mississippi Central from Natchez.

With such ample railway facilities, the next important question is the hotel accommodations, and it is pleasing to note that Hattiesburg has one of the best hotels in the South and by far the most modern and capacious in the State. The official headquarters will be the Hotel Hattiesburg, a modern, fireproof structure, built by Capt. J. T. Jones, President of the G. & S. L. Ry., at a cost of $350,000. This hotel was designed by the architect of the St. Charles, of New Orleans, and the exterior resembles that celebrated hostelry very much, and under the management of Floyd Hughes a service is maintained which satisfies the most exacting. In addition to the Hotel Hattiesburg, the Klondike, Gem and Commercial, with hundreds of hospitable homes which would be thrown open if the number of visitors exceeded expectations, the visiting disciples of Esculapeus need have no care for shelter or food, as Hattiesburg has more than once entertained conventions equal or greater than the membership of the Southern Medical Association.

In fact, the members of the association need have no fear that Hattiesburg will not provide everything needed for their convention. The city has all the modern conveniences, and as a commercial and manufacturing center ranks with the largest in Mississippi, having some big things that no other city in the State can compete with. It is a fact not generally appreciated that Hattiesburg is the capital of yellow pine; more mills can be reached direct from this city than from any other railway center in the South. Hattiesburg has the largest bank, the largest sawmill, the largest fertilizer factory, the largest mill supply and general hardware establishment, the largest machine shops for commercial work, the largest electrical generating plant and the finest office buildings in the State.

Hattiesburg is accustomed to big things, and it has never occurred to a citizen of our city that there would be any difficulty in providing entertainment for any convention that Hattiesburg saw fit to invite within her hospitable gates.

W. W. CRAWFORD, M. D.,
Cairman Committee on Entertainment.

Editor SOUTHERN MEDICAL JOURNAL.

I have thought from time to time that I would like to say a word in favor of the specific in eclampsia, veratrum viride. It seems strange to me that in all the medical profession there should be a man to doubt the efficacy of veratrum in eclampsia and allied conditions, especially in the South, where it has been extensively used for the last sixty years and perhaps longer. While my personal experience extends over only a dozen years, my judgment of its therapeutic value is confirmed by the accumulated experience of three generations. Dr. Dean, of Woodstock, Ga., who was our family physician in my boyhood, and his son, who inherited his practice, rely exclusively upon veratrum in the treatment of *typhoid fever*, and to most of the families in the surrounding country the picture that is associated with that disease is the sideboard containing the bottle of "fever drops," a bottle of whiskey and another of turpentine emulsion.

I have no classified records of their cases, but they run into the thousands, and in every

case they invariably used veratrum from beginning to end, and, strange to relate, few of their patients died. After graduating in 1898 and becoming acquainted with the horror with which most of our modern practitioners look upon the cardiac depressants, I took it upon myself to ask the younger of the Deans, who was then practicing, about his abundant use of veratrum in typhoid fever and his mortality.

His record, so far as death rates are concerned, compares favorably with that of the leading hospitals and sanitariums. Now, these are cold facts and can be substantiated by numbers of reputable physicians now practicing in that section. But it is in convulsions, and especially in eclampsia, that veratrum stands as a therapeutic agent that has no equal.

A doctor, armed with a hypodermic syringe and Norwood's tincture, can go into such a case "where angels fear to tread" with a confidence that will never be shaken.

The faces of children convulsed with horrible spasms from causes we know not of will, after a few doses, relax into smiles of comfort and relief.

The day that sees veratrum viride dropped from our Materia Medica, as has been proposed by men who are evidently entirely ignorant of its value, will witness the loss of one of its most reliable and valuable drugs. Though it may be banished from the text-books, it will never be left out of the armamentarium of a doctor who has once tested its value. DR. C. O. FOWLER.

Spring Hill, Tenn., July 18, 1911.

(The Editors of this Journal heartily endorse the position taken by Dr. Fowler concerning veratrum in eclampsia.)

THERAPEUTICS

ANTIPYRETICS.

The season is upon us when control of abnormally high temperature will be an important necessity in nearly every case whose responsibility is assumed by the physician. Whether the patient be suffering from the condition most prevalent from now until cold weather, which is estivo-autumnal malarial infection, or its frequent imitator, typhoid fever, the temperature will be a constant cause of watchful anxiety.

In a previous article the writer has briefly mentioned some of the principal points directing the doctor to a decision as to the necessity of antipyretic measures. In the present article the writer takes it for granted that for good and sufficient reasons the physician determines to reduce the temperature of his patient. But how? Which antipyretic drug, application or procedure shall he adopt? Foremost in the text-books stands that method of using cold water known as the Brand treatment. Stripped of unnecessary verbiage, it may be described, when rigidly administered, as follows: The patient, lying on a sheet under which is a rubber cloth, is lifted by the sheet corners into a bath tub by the bedside. The tub contains a sufficient quantity of water of a temperature of 70 degrees F., in which the patient is gently but briskly massaged by from two to four attendants, two on each side, and kept therein for fifteen minutes. (See Ander's Practice, 1909.) Recent practice modifies the above very much. For young, nervous or aged patients the water may be as warm as 90 degrees F., and then gradually cooled to 80 degrees F., or even 75 degrees F. in extreme cases. Constant massage must be kept up, and it is well to keep a cold, wet cloth on the patient's head.

Cases that have progressed to an advanced stage, say the third week; cases of extreme

debility; cases with intestinal hemorrhage, weak hearts, peritonitis, or when aged or greatly debilitated, should not be immersed.

In suitable cases the Brand treatment thus modified is undoubtedly the most efficient and life-saving measure available in the treatment of fever caused by typhoid infection. In such cases the patient may be immersed whenever the temperature is as high as 102 degrees F., but must be lifted out, quickly dried and placed in bed when it has fallen one degree, for it will generally continue to subside.

If great depression seems to result, one or two tablespoonfuls of good whiskey in an equal quantity of sweetened water will generally cause a reaction.

In the early days of adoption of the Brand treatment by American physicians too many of us followed blindly the example set by our German leader, unmindful of the difference in nerve tension existing between his people and ours. As a result, many distressing cases of "scientific" treatment, applied without discretion and governed only by the thermometer, caused us for a time to look askance at the measure.

The high temperature resulting from the exanthemata yields readily to the Brand bath; and since the days of Niemeyer cold bathing has been used in Germany to control the fever of pneumonia.

Estivo-autumnal fever is generally controlled by one of the coal tar antipyretics, frequently by the prescription given in a previous number, viz: Acetphenetidin or acetanilid, with bicarbonate of soda and citrated caffeine, or with carbonate of ammonia and soda; in either case a little codeine helps wonderfully.

More American physicians use the cold sponge bath than the plunge. It is more easily administered, less disturbing to the household and not so alarming to the patient. First, a cold, wet compress on the forehead. Then one hand, arm and shoulder are gently bathed and massaged. If the skin is very hot, the water to begin with should be at not less than 102 degrees F. This will avoid shocks and shivering, and its rapid evaporation will carry off body heat very rapidly, and will have a grateful, comfortable feeling to the patient. It is charming, to a doctor of any sensibility, to see a fretful, shrinking child, who has dreaded the touch of cold water, quickly relax its little muscles, and, with a trustful smile, yield to the soothing touch of an experienced or discreet nurse.

A tablespoonful of pure grain alcohol, but never the deadly wood alcohol, added to each quart of water, seems to do good. When one arm is cooled and dried, it is placed under the sheet and the other similarly treated. Then the lower extremities receive attention, beginning at one knee and working first toward the foot, then upward, stopping at the hip. Then the other leg is likewise treated. By this time the fever should have subsided so that bathing the spine and scapulae would seem unnecessary, but it is worth while. In severe fevers the whole routine may have to be repeated every two or three hours. Though hard on the nurse, it is easy on the patient, who often goes to sleep under its sooting influence.

When such fevers as have been mentioned refuse to yield to the plunge or towel bath, the addition of a moderate dose of sulphate of morphine, according to age and strength, will often have a magical effect, the patient relaxing into free perspiration.

Then a quiet nap, with only light covering, will do immense good. All the "disguise of symptoms" and the "retarding of secretions" that it will cause are far outweighed by the prompt and evident good accomplished by a few hours of forced quiescence and relaxation of nerve fibres strained to the breaking point by the excitement resulting from bacterial or plasmodial toxins.

A more powerful and not very unpleasant antipyretic bath may be arranged as follows: Spread a blanket over a cot, letting half hang over one side. Fold a sheet once lengthwise,

wring it out in water at 80 degrees F., and lay it on the blanketed cot. Lift the patient on to the folded, wet sheet, and spread a similar folded wet sheet over him. Then throw the free end of the blanket over all. If the fever does not fall considerably in fifteen minutes, turn the blanket back and sprinkle the top sheet freely with cold water. In half an hour the fever should be much lower, and the patient, in a warm perspiration, can be placed in bed and lightly covered. This procedure may safely be repeated every three or four hours if necessary. No apology is offered, kind reader, for the elementary instruction here presented. You, who know all about everything already, need no teaching of any kind. But we who are constantly stumbling in a path whose every crook and cranny we think we know perfectly well are often glad of a hint or two even about familiar things.

BOOK REVIEWS.

OPHTHALMIC MYOLOGY. A SYSTEMATIC TREATISE ON THE OCULAR MUSCLES.

By G. C. Savage, M.D., Author of "New Truths in Ophthalmology," "Ophthalmic Neuro-Myology," etc. Second Edition. Six plates, eighty-four illustrative cuts. Published by the Author. Printed by McQuiddy Printing Company, Nashville, Tenn.

Dr. Savage is well known everywhere as one of the most profoundly scientific, yet practically successful specialists in ophthalmology in this country, yet he might well be content to leave this great work as his intellectual monument for the admiration and instruction of future generations of ophthalmologists. It required courage to take issue with the great Helmholtz on one of his fundamental propositions, but that is what Dr. Savage has done in this book, and, what is more, he mathematically proves, apparently beyond contradiction, the correctness of his assumption. All this important matter is clearly set forth in the 145 pages and 27 illustrations constituting the first chapter. What follows in the eleven remaining chapters is but the logical superstructure. The points at issue may be stated thus:

"Is the center of the cornea always the anterior pole?" Helmholtz says yes; Savage, no.

"Is the central point of the macula always the posterior pole of the eye?" Helmholtz says no; Savage, yes.

"Do all secondary visual lines cross the visual axis at the center of retinal curvature—the center of rotation?" Helmholtz says no; Savage, yes.

"Do all secondary visual lines cross the visual axis at the nodal point?" Helmholtz says yes; Savage, no.

Dr. Savage claims, and apparently proves, that "the center of the macula is the posterior pole of *every* eye, ideal or non-ideal; and that the center of the cornea is the anterior pole of the ideal eye *only*."

No other author has published these principles, yet upon them must hang the accuracy of most important observations and calculations. The eminence Dr. Savage has attained both as teacher and operator goes far to prove the correctness of his assumptions, and few who read this book will fail to be convinced thereof. Consequently it seems to the reviewer that no specialist in the treatment of defective vision can be thoroughly competent to diagnose and treat every such abnormality until he has read and mastered the first chapter of this book. It solves a score of problems. It seems to the reviewer that the position assumed in the first chapter is impregnable and the statements unanswerable.

CASE HISTORIES IN PEDIATRICS.

By John Lovett Morse, A.M., M.D., Assistant Professor of Pediatrics, Harvard Medical School. Octavo of 320 pages, and a few illustrations. W. M. Leonard, Publisher, 101 Tremont Street, Boston. 1911. Price, express prepaid, $3.00.

The method of case teaching, though practically speaking a new feature of instruction, is rapidly gaining universal approval. It is nothing short of a *clinical course at home*, when a physician cannot avail himself of the rare opportunity and advantages of study at the larger clinical centers. To the student, it offers an unusually interesting adjunct to his regular course in pediatrics.

Dr. John Lovett Morse has collected one hundred cases, illustrating the various diseases of children met with in practice, and compiled them in a manner appropriate for systematic study. These cases represent actual cases, which have come under the author's observation, thus the work represents a real clinical storehouse.

JOINT TUBERCULOSIS.

By Leonard W. Ely, M.D. Octavo of 243 pages, 72 illustrations. William Wood & Company, 51 Fifth Avenue, New York. 1911. Price, $2.50 net.

The need of such a work may be set forth by a quotation from the author's preface: "It has been my ambition to write a book on joint tuberculosis. Watson-Cheyne and Senn have both performed the task, but these books, practically the only ones in English, were written some years ago. The time seems ripe for another work which should embody the more recent knowledge on this interesting branch of surgery." After prolonged studies of clinical material, both his own and his colleagues, and diligent research in pathological laboratories, the author has compiled facts and presents in a complete

and accessible way the results of his studies on tuberculosis of the joints.

Included in the Section II. are chapters dealing with the special lesions and the peculiar methods of treatment as applied to each. Such phases of the subject are presented, as, tuberculosis of the spine, hip joint, knee, wrist, shoulder, etc.

Viewing the work as a whole, it undoubtedly will receive a hearty and enthusiastic reception, not only by the surgeons, but by the profession at large.

DISEASES OF INFANTS AND CHILDREN.

By John Ruhrah, M.D., Clinical Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. A Manual of Diseases of Infants and Children. Third Revised Edition. 12mo volume of 534 pages, fully illustrated. Philadelphia and London: W. B. Saunders Company. 1911. Flexible leather, $2.50 net.

For the first year's study in pediatrics this text is admirably suited, being adapted to the limited time which the student has to devote to one of the many subjects required of him during the third and fourth years of medical training. It is brief and concise, yet ample for the needs as a text. In many of our medical institutions, this work is recommended as a very valuable and time-saving hand-book on pediatrics.

THE TREATMENT OF DISEASE—A MANUAL OF PRACTICAL MEDICINE.

By Reynold Webb Wilcox, M.A., M.D., LL.D. P. Blakiston's Son & Co., Philadelphia. $7.50 net.

This is the third edition of this practical work by the well known author of books on Pharmacology, Therapeutics and Practice. A long experience in observing, practicing and teaching medicine has given to Doctor Wilcox that subtle, indescribable gift of expression so indispensable to one who seeks to convey from his own mind to that of another the deep truths of pathological and therapeutic phenomena.

This book is another example of the impending return swing of the pendulum in medical instruction from the ultra scientific, do-nothing literature, full of etiology, pathology and diagnosis but barren of treatment that characterized the "authorities" of ten or fifteen years ago, towards a possible extreme opposite where the necessary, careful study of phenomena and their causes will be neglected for the sake of expanded considerations of the therapeutic element of the practice of medicine. At present the revulsion against the imbecility of therapeutic nihilism has gone just far enough.

HOSPITAL MANAGEMENT.

A Hand-book for Hospital Trustees, Superintendents, Training School Principals, Physicians, and all who are actively engaged in promoting hospital work. By Charlotte A. Aikens, Author of "Hospital Training-School Methods and the Head Nurse;" "Primary Studies for Nurses;" "Clinical Studies for Nurses." 12mo of 488 pages, illustrated. Philadelphia and London: W. B. Saunders Company. 1911. Cloth, $3.00 net.

The title indicates completely the nature of the above work, which is a "hand-book" on hospital management. This work will serve as a very useful guide for those interested in promoting such an institution as a hospital. "Its purpose is to promote system, economy, and a better understanding of the principles that underly successful, efficient hospital administration." After an introductory chapter on the general subject of "The American Hospital Field," the subject-matter is primarily that of instruction, to those concerned, in how to equip and manage hospitals of various capacities, and setting forth the duties of superintendents, and others connected with the management. The methods of hospital bookkeeping, the arrangement of the kitchen, the equipment of the hospital store, and the laboratories, are valuable chapters. The chapter on "The Dietitian's Province and Its Management" is worthy of the consideration of not only those directly connected with hospital work, but of those in every household, who attend to such work. "The Training School and Its Management" deserves special mention.

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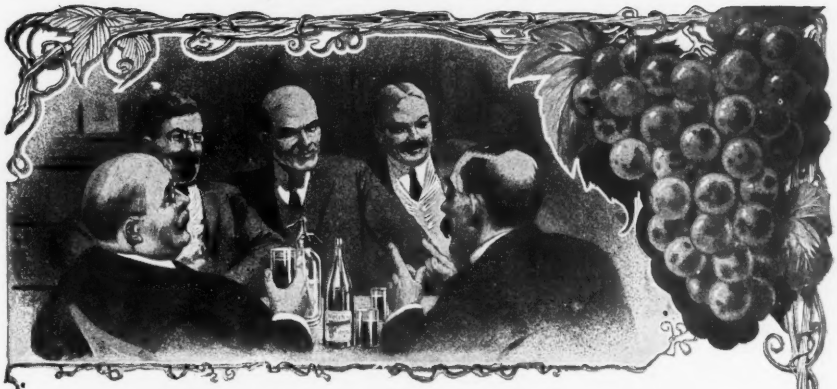

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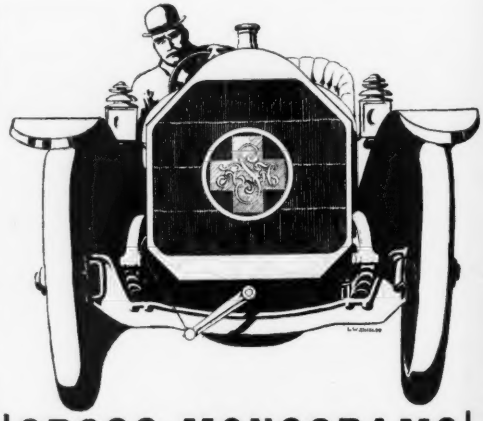

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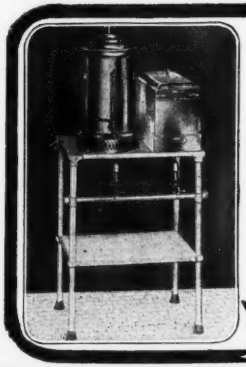

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¶ The recent census of the United States shows that six Southern States prove a net gain of population amounting to 2,260,215 during the past ten years. The figures would be much larger but for the fact Georgia and Florida are omitted because their census reports are not complete at the time of writing this article. Thə average gain in population by the six States in the ten years is about 16 per cent.

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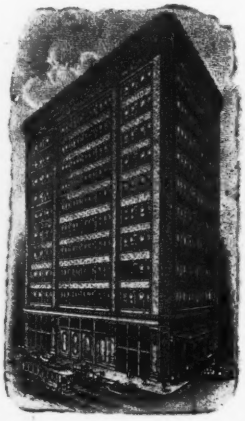

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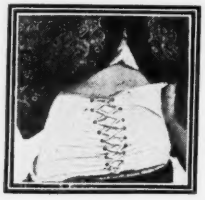

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Convenient: Ready for instant use. It is no longer necessary to wait until water can be sterilized and cooled. Each ampoule contains a definite quantity of medicament, an average dose.

Aseptic: The solution is asepticized by heat or filtration through porcelain. The active substance is dissolved in a suitable menstruum—washed olive oil, distilled water or physiological salt solution.

Permanent: Permanence is insured by the hermetically sealed container, which prevents infection by bacteria and oxidation by air, the actinic effect of light being prevented by enclosure of the ampoule in an impervious cardboard carton.

OUR ASSORTMENT INCLUDES:

ADRENALIN CHLORIDE SOLUTION, ℞ 1 and ℞ 2 (℞ 1, 1:10,000; ℞ 2, 1:3200).—Used in asthma, shock, inaccessible hemorrhage, chloroform and opium narcosis, etc. (1 Cc. ampoules.)

ARSENITE OF IRON (1 grain): Iron Arsenite with Ammonium Citrate.—Used in the treatment of dry, scaly forms of cutaneous disease, anemia, chlorosis, etc. (1 Cc. ampoules.)

ARSENITE OF IRON AND STRYCHNINE: Iron Arsenite with Ammonium Citrate (1 grain) and Strychnine Nitrate (1-65 grain).—Used in atonic dyspepsia with anemia; chlorosis; malnutrition, convalescence, etc. (1 Cc. ampoules.)

CACODYLATE OF SODIUM:

¾ Grain.—Used in the treatment of anemia, the malarial cachexia, syphilis, neurasthenia, psoriasis, and generally as a substitute for Fowler's Solution. (1 Cc. ampoules.)

3 Grains.—Intended especially for use in the treatment of syphilis. (1 Cc. ampoules.)

CAFFEINE AND SODIUM BENZOATE (7½ grains, equivalent to 3¾ grains Caffeine).—Used as a diuretic, heart stimulant, cerebral stimulant, etc. (1½ Cc. ampoules.)

CAMPHOR IN OIL (3 grains): Olive Oil in Camphor —Used as a diffusible heart stimulant in nervous depression, etc. (2 Cc. ampoules.)

CODRENIN, ℞ "C": Adrenalin (1:10,000) and Cocaine Hydrochloride (¼ of 1%).—Used as a local anesthetic in dentistry, and in ophthalmic, rhinologic and general surgery. (1 Cc. ampoules.)

ERGOT ASEPTIC (equivalent to 30 grains Ergot).—Used in the treatment of uterine inertia, metrorrhagia, menorrhagia, collapse, pulmonary hemorrhage, etc. (1 Cc. ampoules.)

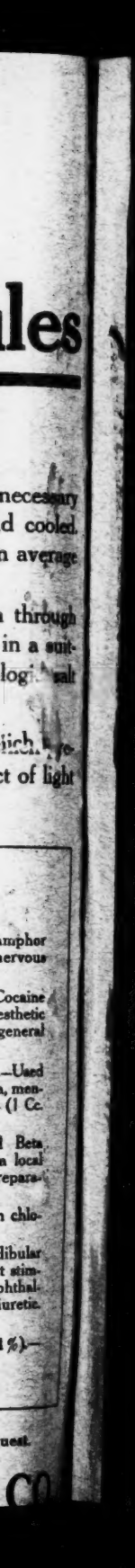
EUDRENIN, ℞ "B": Adrenalin (1:10,000) and Beta Eucaine Hydrochloride (¼ of 1%).—Used as a local anesthetic; preferred by some operators to preparations containing cocaine. (1 Cc. ampoules.)

FERRIC CITRATE, U.S.P. (2 grains).—Used in chlorosis, anemia, etc. (1 Cc. ampoules.)

PITUITRIN: The active principle of the infundibular portion of the Pituitary Gland.—Used as a heart stimulant in shock, after severe hemorrhage, in exophthalmic goitre and cardiac neuroses; a valuable diuretic. (1 Cc. ampoules.)

QUININE AND UREA HYDROCHLORIDE (1%).—Used as a local anesthetic. (5 Cc. ampoules.)

Descriptive matter on any or all of the solutions above mentioned will be sent, postpaid, on receipt of request.

Home Offices and Laboratories,
Detroit, Michigan.

PARKE, DAVIS & CO